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Lawton Planning Dept., Oklahoma

Prepared For
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April 1976

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ENVIRONMENTAL NOISE ASSESSMENT
LAWTON, OKLAHOMA

APRIL, 1976
FINAL REPORT
U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION VI
DALLAS, TEXAS 75270

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16. ABSTRACT

Using a simple methodology employing inexpensive equipment as described in this report, Lawton, Oklahoma, assessed environmental noise levels in their community during the summer of 1975. They measured equivalent sound levels at eleven sites within the city and identified major sources of noise. The results showed only two areas in Lawton with probable adverse noise impacts, both in the vicinity of local airfields. Small aircraft, automobiles, and helicopters were the most prevalent sources of intrusive environmental noises. Jet aircraft were the most intense.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Community Noise Urban Noise Surveys Noise Measurements Noise Surveys	Equivalent Sound Level Lawton, Oklahoma Fort Sill, Oklahoma	

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ENVIRONMENTAL NOISE ASSESSMENT
LAWTON, OKLAHOMA

APRIL 1976

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Michael L. Mendias

Prepared for
City of Lawton
Lawton, Oklahoma 73501

In Cooperation With
U.S. EPA, Region VI
Air and Hazardous Materials Division
Dallas, Texas 75270

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DISCLAIMER STATEMENT

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PREFACE

This report presents a methodology which communities can use to adequately assess local environmental noise simply and inexpensively. The methodology is a refinement of that reported and validated in Environmental Noise Assessment-Waco, Texas Metropolitan Area (U.S. EPA, Region VI, April 5, 1974). It involves only simple instruments available on loan from EPA and can be conducted successfully by personnel inexperienced in noise measurements.

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INTRODUCTION

This community noise assessment resulted from a request of the Mayor of Lawton, Oklahoma, to the Regional Administrator of the U.S. Environmental Protection Agency dated February 28, 1975. He requested technical assistance to conduct a noise study for the area north of the Lawton Municipal Airfield. This request was subsequently expanded to encompass the entire community after consultation between Lawton and the EPA.

The EPA is authorized to provide such technical assistance to local governments by Section 14 of the Noise Control Act of 1972 (Public Law 92-574) as part of its broad mission to promote an environment for all Americans free from noise that jeopardizes their health or welfare.

Interest in a local noise assessment in Lawton was the result of several recent actions by the U.S. Department of Housing and Urban Development based upon predicted noise levels in the community. Some of these actions had potentially adverse effects upon the City of Lawton. Thus, one purpose of this assessment was to document actual noise levels in the city.

The specific objectives of this assessment were:

a. To determine by actual measurement if there was a noise problem in the area north of the Lawton Municipal Airfield.

b. To determine if there was a noise problem in other areas of the city.

c. To provide the City Council with information for their evaluation of the need for noise control measures.

d. To provide the Lawton Metropolitan Area Planning Commission with environmental data for use in land use planning.

e. To provide a basis of appeal, where appropriate, from restrictions imposed by other agencies based on theoretical studies.

f. To assist the public in understanding the sources of environmental noise, its proper measurement, its effect and noise control possibilities.

g. To train City employees in noise monitoring techniques.

h. To establish a base for comparison with future studies.

The assessment was conducted during the summer of 1975, primarily between June 20 and 23. The EPA provided training and equipment for the assessment. The City of Lawton Planning Department provided administration, and obtained needed personnel from other city departments and a summer youth hire program.

Portions of Lawton are subjected to impulsive sounds caused by artillery firing at Fort Sill adjacent to the City. Since measuring the level and assessing the effects of such impulsive sounds require instruments and procedures incompatible with the requirements for more conventional sounds, no measures of artillery noise levels are included in this report. Where artillery noise was noted by the operators of noise monitoring stations, only the number of loud discharges heard is reported. This gives some indication of the significance of artillery noise at that location.

CONCLUSIONS AND RECOMMENDATIONS

The environmental noise data collected in this assessment indicate that:

1. Few locations within the City of Lawton are presently adversely impacted by noise.

   This can be preserved and enhanced as the city grows by careful land use planning and the establishment of effective controls for significant sources of environmental noise.

2. There are probable adverse noise impacts immediately north of the Lawton Municipal Airport and immediately south of the Fort Sill Airfield.

   A more extensive assessment should be made for these areas including more rigorous measures of environmental noise; exploration of potential controls on aircraft noise; and consideration of other factors such as safety, costs, compatible land use and community objectives.

3. Small planes, automobiles, and helicopters are the most prevalent sources of obtrusive noise in Lawton and jet planes are the most intense. Generally, obtrusive noises occur infrequently in Lawton.

   The noise of automobiles and other surface transportation equipment can be effectively controlled by establishing decibel limits for vehicle noise emissions. Control of aircraft noise is more complex but establishing compatible land use controls, minimum aircraft altidudes, flight tracks, and operating hours can help alleviate aircraft noise problems.

4. Artillery discharges are clearly audible at several locations within the City of Lawton.

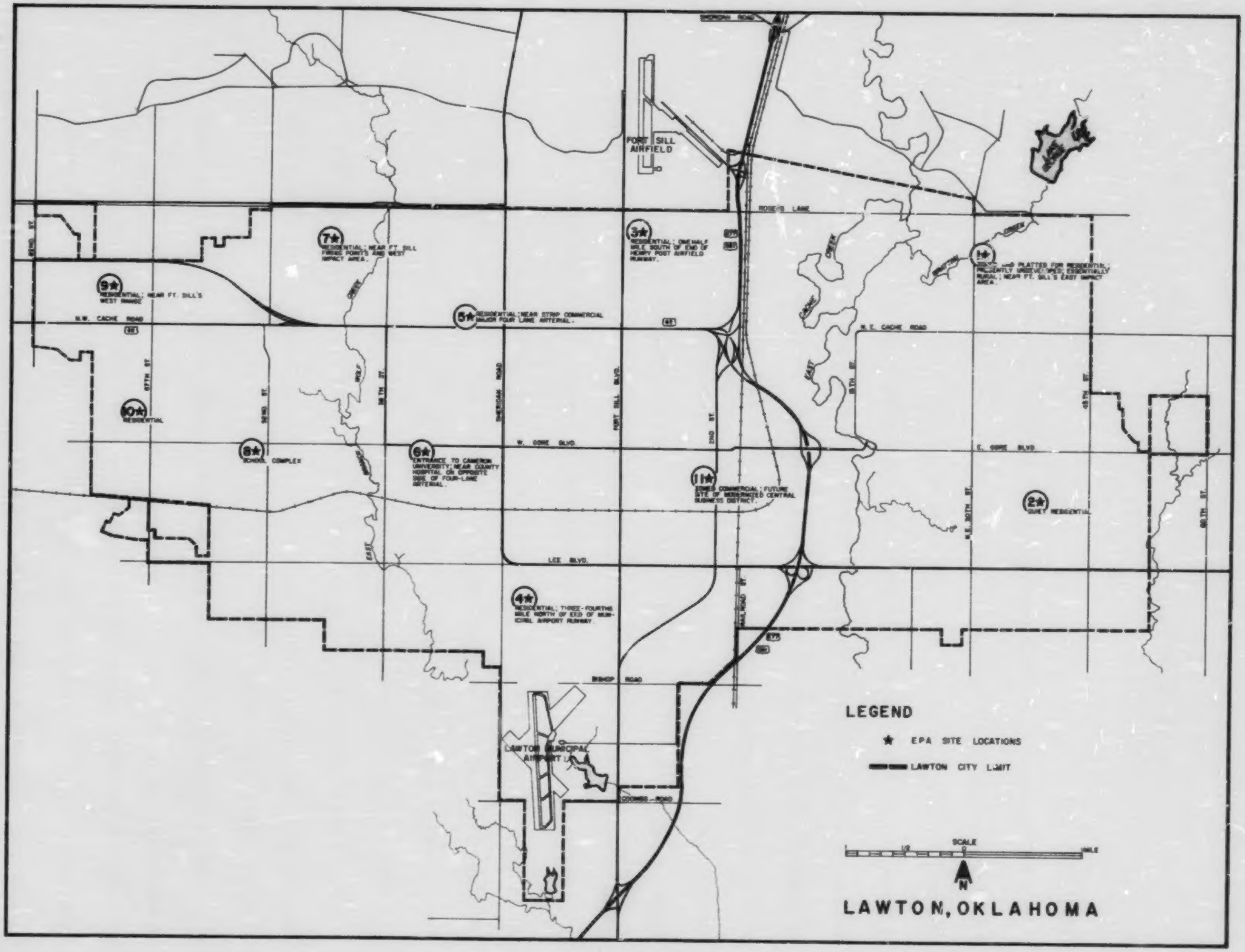
   The effect of these sounds can be accurately assessed only by rigorous and sophisticated measures and/or a social survey of those subjected to the noise.

DISCUSSION

Procedure

The assessment involved measuring and classifying environmental noise at each of eleven locations within the City of Lawton. The measurement sites were selected by city personnel with the concurrence of EPA. They constitute a representative sampling of the entire city (see map, Fig. 1). The sites were located in relatively open areas away from the immediate vicinity of sources of environmental noises such as roadways and buildings. Thus, the data reflect the sound prevailing over an extended area rather than merely sound generated at a specific location. Detailed descriptions of each site are given in Appendix A1. Sound measurements were made by observers using compact, battery powered sound level meters (Pulsar Model 40, type 2), set to 'A' weighting which most accurately correlates with human response to noise. The operators made measurements a 15 second intervals throughout most of each daylight hour, for two days per site, weather permitting. The data for each hour were recorded on a data form similar to that shown in Figure 2. On the form, each entry mark indicates one of the measurements made at 15 second intervals during that hour. Above 70 dBA, rather than a simple mark, the operator used a code letter to identify the type of noise source producing the measured sound. The code letters are indicated on the form.

At the end of each hour, the operator indicated his opinion of the noise environment during that hour on the right hand of the form. He described it both in terms of its noisiness and in terms of its acceptability by marking one of the categories listed. Copies of the detailed instructions given each operator, monitoring schedules, etc. are included in Appendix C.


FORT SILL AIRFIELD
SHERIDAN ROAD
ROGERS LANE
CREEK
CACHE CREEK
EAST CACHE
MEDICINE CREEK
1★ ZONED PLATTED FOR RESIDENTIAL; PRESENTLY UNDEVELOPED; ESSENTIALLY RURAL; NEAR FT. SILL'S EAST IMPACT AREA.
2★ QUIET RESIDENTIAL
3★ RESIDENTIAL; ONE-HALF MILE SOUTH OF END OF HENRY POST AIRFIELD RUNWAY.
4★ RESIDENTIAL; THREE-FOURTHS MILE NORTH OF END OF MUNICIPAL AIRPORT RUNWAY.
5★ RESIDENTIAL; NEAR STRIP COMMERCIAL MAJOR FOUR LANE ARTERIAL.
6★ ENTRANCE TO CAMERON UNIVERSITY; NEAR COUNTY HOSPITAL ON OPPOSITE SIDE OF FOUR-LANE ARTERIAL.
7★ RESIDENTIAL; NEAR FT. SILL FIRING POINTS AND WEST IMPACT AREA.
8★ SCHOOL COMPLEX
9★ RESIDENTIAL; NEAR FT. SILL'S WEST RANGE
10★ RESIDENTIAL
11★ ZONED COMMERCIAL; FUTURE SITE OF MODERNIZED CENTRAL BUSINESS DISTRICT.
82ND ST.
N.W. CACHE ROAD
67TH ST.
52ND ST.
38TH ST.
WOLF CREEK
EAST
W. GORE BLVD.
FORT SILL BLVD.
2ND ST.
LEE BLVD.
RAILROAD ST.
BISHOP ROAD
COOMBS ROAD
LAWTON MUNICIPAL AIRPORT
N.E. CACHE ROAD
11TH ST.
E. GORE BLVD.
N.E. 30TH ST.
45TH ST.
60TH ST.
62
277
281
LEGEND
★ EPA SITE LOCATIONS
LAWTON CITY LIMIT
SCALE
1/2
0
1 MILE
N
LAWTON, OKLAHOMA

COMMUNITY NOISE ASSESSMENT DATA SHEET

COMMUNITY LAWTON

STATION NO. 3
OPERATOR Smith
DATE 24 June 1975
DAY S M [✓ T] W T F S
TIME 20:00 TO 21:00

METER CHECK
BATTERY ✓ OK ___ REPLACED
SETTINGS ✓ A ✓ FAST
CALIBRATION SET TO 94.0 dB
END READS 94.2 dB

TRANSPORTATION
E ___ EMER. VEH.
P 2 SMALL PLANE
J ___ JET
[✓ H] 4 HELICOPTER
R ___ RAILROAD
T ___ TRUCK
[✓ A] 1 AUTO
B ___ BUS
M 2 MOTORCYCLE
W ___ WATER CRAFT
V ___ OFF RD. VEH.

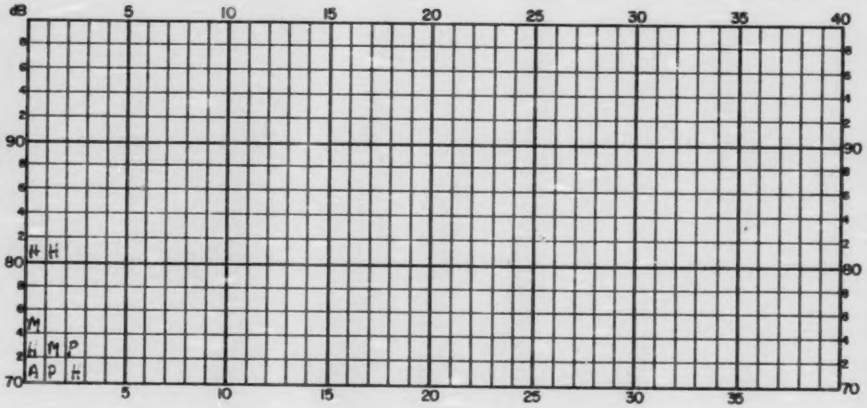
MACHINERY
C ___ CONSTRUCTION EQUIP.
Y ___ YARD MAINT. EQUIP.
F ___ FACTORY EQUIP.
h ___ HOUSEHOLD EQUIP.

OTHER
D ___ DOG
L ___ LOUD SPEAKERS

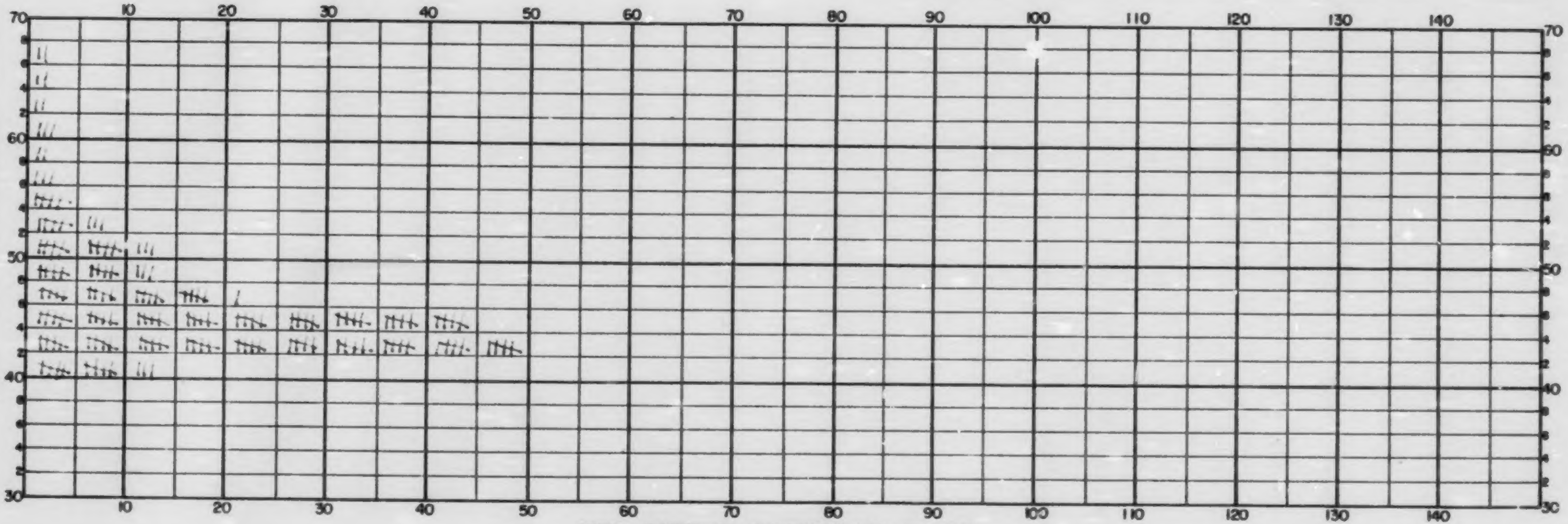
DESCRIPTION
___ V. QUIET
___ QUIET
✓ M. NOISY
___ NOISY
___ V. NOISY

EVALUATION
___ V. ACCEPT.
___ ACCEPT.
✓ M. UNACCEPT.
___ UNACCEPT.
___ V. UNACCEPT.

NO.	TOT.
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	2
11	
12	
13	1
14	3
15	3



16	
17	2
18	2
19	2
20	3
21	2
22	3
23	5
24	8
25	13
26	13
27	21
28	45
29	50
30	13
31	
32	
33	
34	
35	



TOTAL NUMBER OF OCCURANCES PER dB LEVEL

The data obtained were reduced by computer after being transferred to optical scanning coding forms. The computer statistically analyzed each hour's data and calculated the corresponding percentile sound levels (L_n), and the energy equivalent average sound level (L_{eq}), (see Glossary). It also made similar calculations for the combined daily data for each site and calculated the corresponding day-night average sound level (L_{dn}). Appendix D contains a sample data form, the computer program, and a sample prinout.

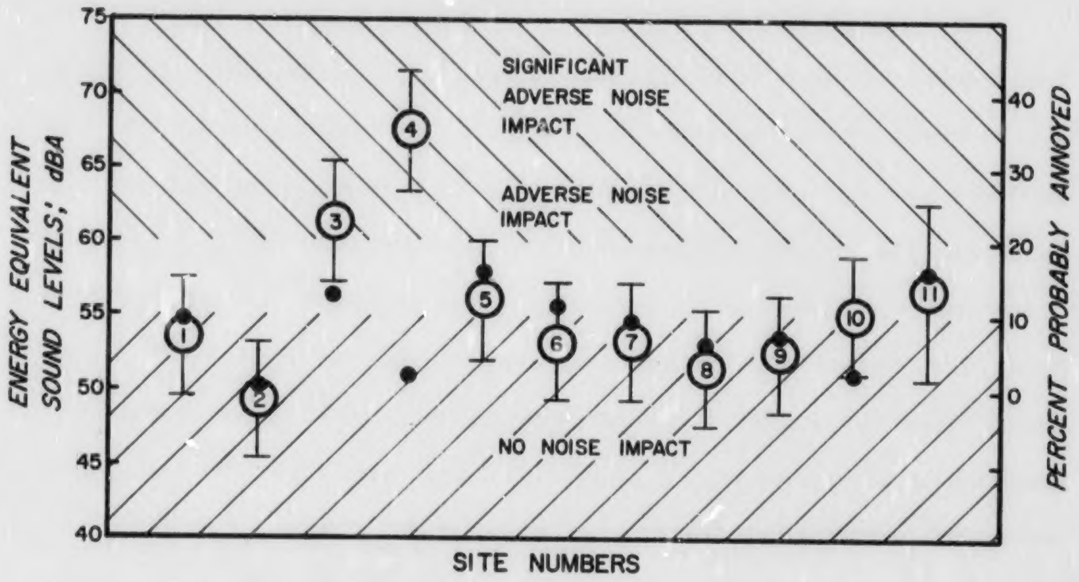
Results

The measured environmental noise levels are summarized in Figure 3. The Figure shows the mean equivalent sound level (L_{eq}) calculated from all of the measurements made at each specified site. The 95 percent confidence intervals for those means based on the observed variance in daily L_{eq} at each site are indicated. The data are compared with the levels identified in the EPA Report "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety" (EPA 550/9-74-004, March 1974; this document provides information only, it is not a standard, specification or regulation). It is clear that only sites three and four, those nearest the two airfields, have probable adverse noise impacts.

The Figure also shows the tenth percentile noise level (L_{10}) for the combined data from each site. This is included for comparison with the equivalent sound levels (L_{eq}). In a normal noise environment, L_{10} has generally about the same value as L_{eq}, as is the case at most of the sites. This indicates that the L_{eq} value reflects the composite sound produced by a multiplicity of sound sources. However, when L_{eq} significantly exceeds L_{10} as at sites three and four, relatively few, very intense sound sources are dominating the calculated L_{eq} value. In these cases, L_{10} gives a crude measure of the potential L_{eq} if these few, intermittent noises were adequately controlled. Thus, for example, site four is generally a quiet location except for infrequent but very intense interruptions by noise from jet aircraft. Detailed breakdowns of the data are given with the detailed descriptions of each site in Appendix AI.

DATA SUMMARY

MEAN SOUND LEVELS FOR EACH SITE



LEGEND

MEAN EQUIVALENT SOUND LEVEL : L_{EQ}, WITH SITE NUMBER AND 95% CONFIDENCE INTERVALS FOR DAILY VALUES

● TENTH PERCENTILE SOUND LEVEL : L_{10}

SITES:

1. KINGSBRIAR
2. SULLIVAN VILLAGE
3. HENRY POST
4. MUNICIPAL AIRPORT
5. CACHE ROAD
6. UNIVERSITY
7. FLOYD
8. EISENHOWER
9. HUNTER HILLS
10. WOODLAND PARK
11. CENTRAL BUSINESS DISTRICT

FIGURE 3

Figure 4 summarizes the observers' opinions regarding the noise environment at the sites they operated. On the average, observers felt their location was quiet about seventy percent of the time and that it was acceptable about eighty percent of the time. These data pool the opinions at all eleven locations. A valid comparison of the opinions at each site is not possible since the differences between sites are confounded with the differences between observer's judgment. That is, since each observer did not monitor each site, differences in the opinions at the various locations reflect not only the differences in environmental noise between locations but also the differences in judgment between the observers at those locations. Avoiding this confounding of data would have required prohibitively complex logistics for an assessment of this size.

Figure 5 summarizes all the information gathered regarding sources producing intrusive environmental noise. The figure shows that small planes, automobiles, and helicopters are the most prevalent sources of intrusive noise. At higher levels of noise, jet aircraft dominate.

The relative areas in the figure give a rough estimate of the total sound energy produced by the various source categories. The two circles are proportioned to facilitate this estimate. The smaller circle, (observed sources over 80 dBA) although involving only about ten percent of the sources, has an area one-fourth of the larger since these sources are two to three times more intense than the others.

SUMMARY OF NOISE RATINGS

ALL SITES-ALL DAYS COMBINED

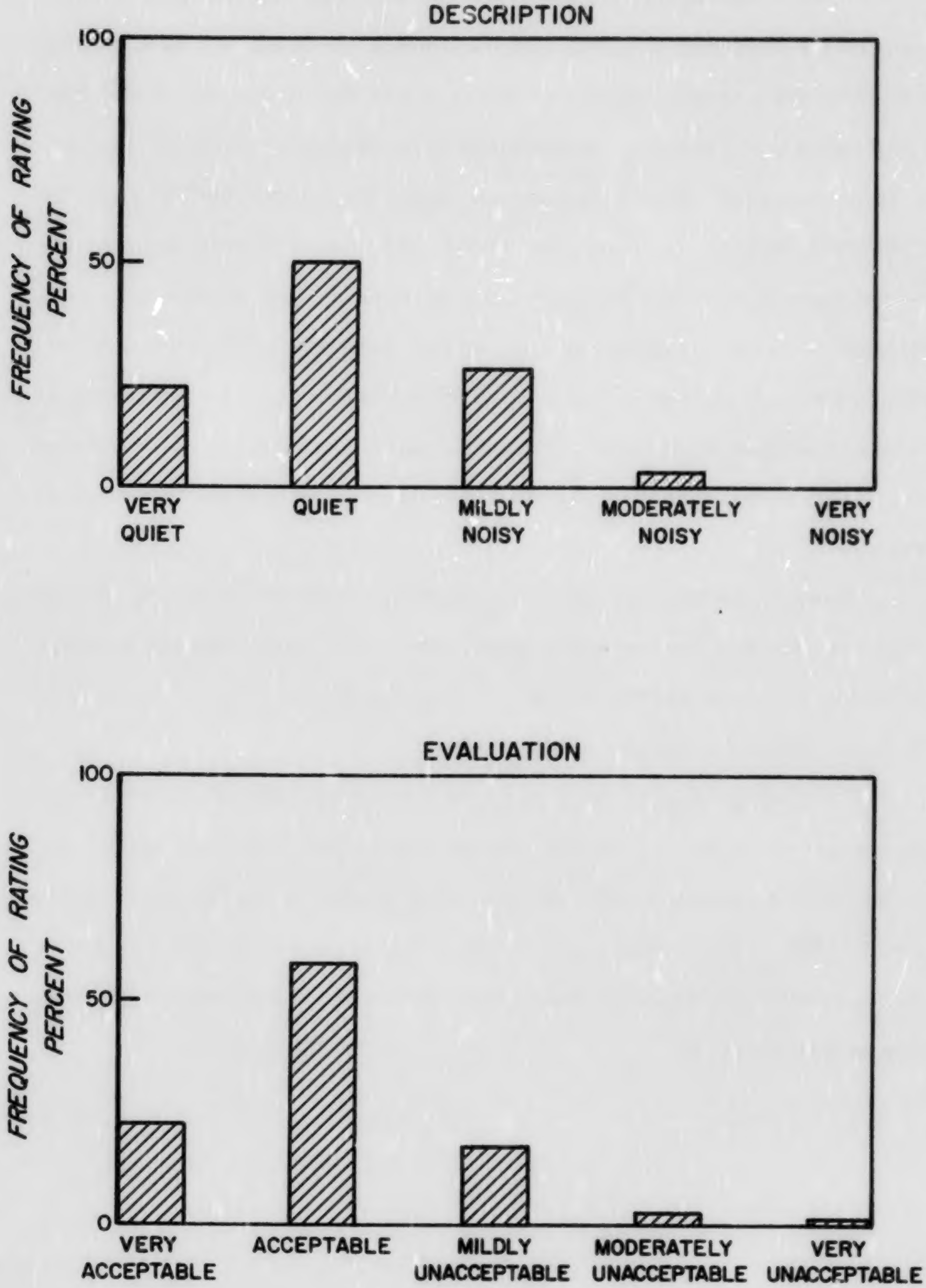


FIGURE 4

SOURCES OF INTRUSIVE NOISE
RELATIVE CONTRIBUTIONS

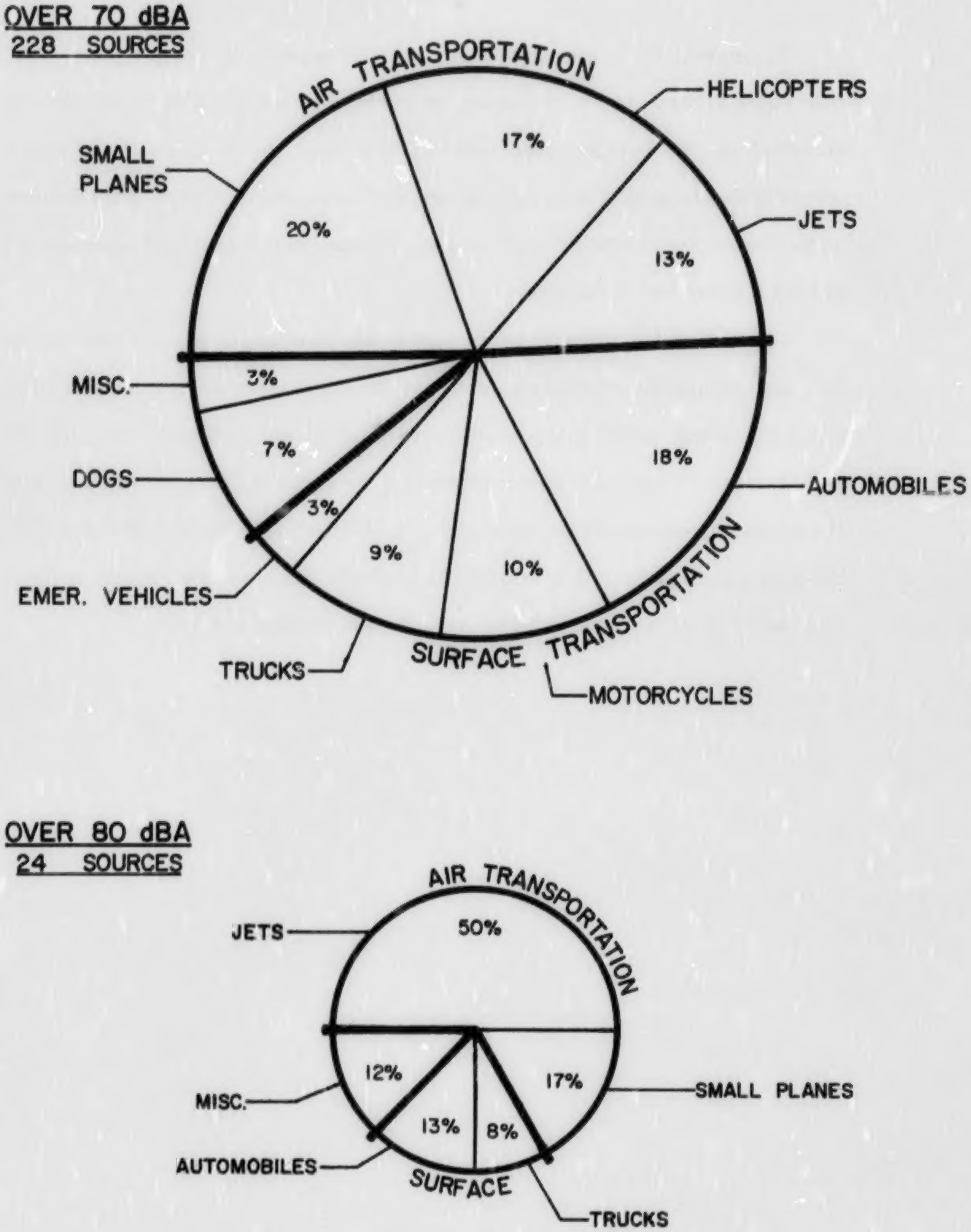


FIGURE 5

In general, these intrusive noises were infrequent, occuring typically less than twice in three hours. However, at the Henry Post site (No. 3) 70 dBA was exceeded on the average over twice in one hour, three times the average, primarily due to small planes, helicopters, and automobiles. Detailed breakdowns of the source observations at each site are included in the details of Appendix A 1 and are summarized in Appendix A 2.

Another source category of interest in this assessment was artillery firing. At lease seventy-five discharges were noted by the observers at the various sites. However, since more sophisticated instruments are required for rigorous measurement of impulsive sound, artillery noise is not reflected in the values of the calculated equivalent sound level (L_{eq}). A schedule of firing activity at Fort Sill during the assessment is included in Appendix E 2. A record of the artillery noise noted at each site is included in the details of Appendix A 1.

APPENDIX A

AI. Site Descriptions and Noise Data Summaries

The appendix contains the details of the data for each site. The information for each is presented in the same pattern.

First, a description of the site and its environment is given including population statistics trends, traffic statistics and projections, and descriptions of local land use and traffic mix. These are supplemented by a land use map of the environment and an aerial photograph and map of the site proper.

Second, the periods of operation at the site are summarized.

Third, the sources of noise observed at the site are described. Two categories are used, typical sources and intrusive sources. The former refer to those sources which the observers at each site indicated were characteristic of the environmental sounds heard there. Generally these are the persistent sources which establish the steady, background noise. The intrusive sources refer to those sources conspicuously louder than the ambient background. That is, those sounds which draw attention to themselves. For consistency, only those sources producing sound at the site in excess of 70 dBA were listed in this category, although some sounds below that level could also be intrusive, depending upon their character. These intrusive sources were identified by the observers using the letter codes discussed in the body of this report. They are reported by source type, intensity range, and number observed. A summary of all intrusive source data for each site is given in Appendix A2.

Finally, hourly and daily summaries of the measured environmental noise levels and a brief evaluation of the results are given. The hourly summaries are plots of the calculated equivalent sound levels (L_{eq}) by the hour for each site and day. They give the temporal variation of environmental sound observed at the site that day. At some sites, a pattern can be seen reflecting increased noise due to commuter traffic in the morning and evening rush hours. However, a surprising number of sites showed no discernible temporal pattern. In addition to the hourly L_{eq} values, statistical percentile levels of the measured sound are given for each hour - L_{max}, L_{10}, L_{50}. These are respectively, the highest sound levels measured during the hour, the level above which sounds occurred only ten percent of the time, and the average numerical level of all sound measurements that hour. The latter, of course, differs from L_{eq} which is an average of sound energies rather than an average of sound levels. (See Glossary).

The daily summaries are plots of the statistical distribution of all the measurements at that site that day, and also a tabulation of the daily L_{eq} values. The plots indicate the percentage of time the sound at the site was at or above a particular level. For example, if the plot indicates 54 dBA at the twentieth noise level percentile, then twenty percent of the time sound at that site that day was at or above 54 dBA, and eighty percent of the time below 54 dBA.

The brief evaluations compare the daily L_{eq} levels at the site with those levels published in the EPA "Levels" document mentioned in the body of this report. Also, an estimate of citizens attitudes toward these levels is given based on the contents of that document. Finally, the effects of projected changes in population and traffic volume and any other local factors are assessed.

NO. 1 KINGSBRIAR

I. Site Description

A. Population:

(Vicinity Map)	1972 -	0
	1975 -	15
	1995 -	300

B. Land Use

This is an undeveloped area. A small portion of it has been platted for residential development. It is expected that it will be much more fully developed by 1995. At the time of the assessment only three homes had been completed and occupied. It is approximately 1100 yards from the nearest field artillery firing point at Fort Sill.

C. Traffic

Traffic Counts:	Map Location	1975	1995
(ADT)	1	513	2850

II. Operations

This site was occupied from 6:00 a.m. to 10:00 p.m. on Saturday, June 21 and Tuesday, June 24. This was the only site where thunderstorms did not interrupt operations.

III. Noise Sources

A. Typical Noise Sources

Primary: Automobiles, helicopters

Secondary: Birds, artillery

B. Intrusive Noise Sources

Small planes and helicopters were the most prevalent sources of intrusive environmental noises. However, there was no indication of an unusually high intensity or incidence rate for these sources relative to the other sites. The average incidence rate for all sounds above 70 dBA at this site was one every two hours.

The sources noted during the 32 hours this site was operated are tabulated below:

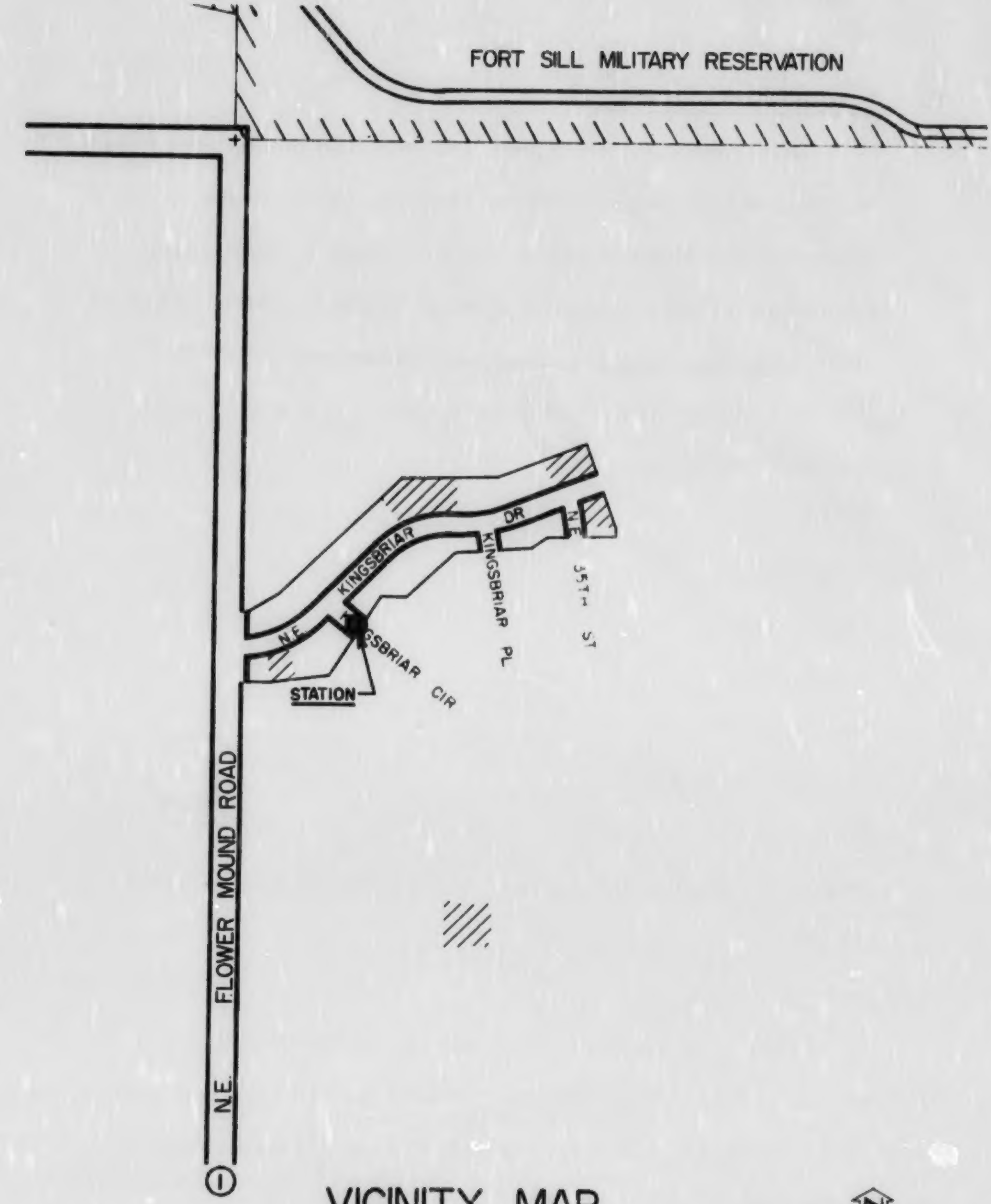
Source	Number over 70 dBA
Small planes	6
Helicopters	5
Automobiles	3
Motorcycles	1
Household equipment	1
Total	16

At this site no other sources were noted and no sources exceeded 80 dBA.

IV. Observations

The daily L_{eq} levels of 55 and 52 dBA indicate little probability of an adverse noise impact existing at this site. At these levels of environmental noise, less than ten percent of the population would probably be highly annoyed by noise.

The projected increases in traffic volume and population will probably increase these noise levels to that of similarly developed neighborhoods.

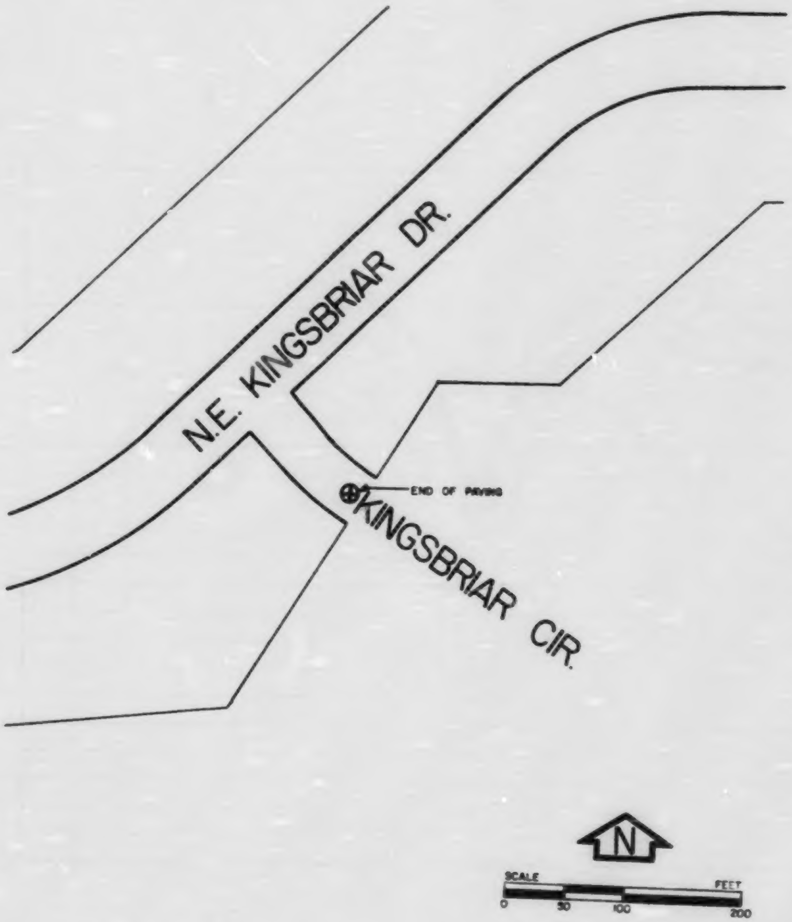

FORT SILL MILITARY RESERVATION
N.E. FLOWER MOUND ROAD
N.E. KINGSBRIAR DR
KINGSBRIAR PL
N.E. 35TH ST
KINGSBRIAR CIR
STATION
①
SCALE FEET
0
500
N

VICINITY MAP

LAND USE

▨ LOW DENSITY RESIDENTIAL
▨ HIGH DENSITY RESIDENTIAL
▤ COMMERICAL
▒ PUBLIC FACILITY
☐ VACANT
▓ INDUSTRIAL

KB SITE # 1


N.E. KINGSBRIAR DR.
END OF PAVING
KINGSBRIAR CIR.
N
SCALE
FEET
0
50
100
200

KB SITE # 1

KINGSBRIAR DR.
1110.4

AERIAL PHOTO

N
SCALE
FEET
0
50
100
200

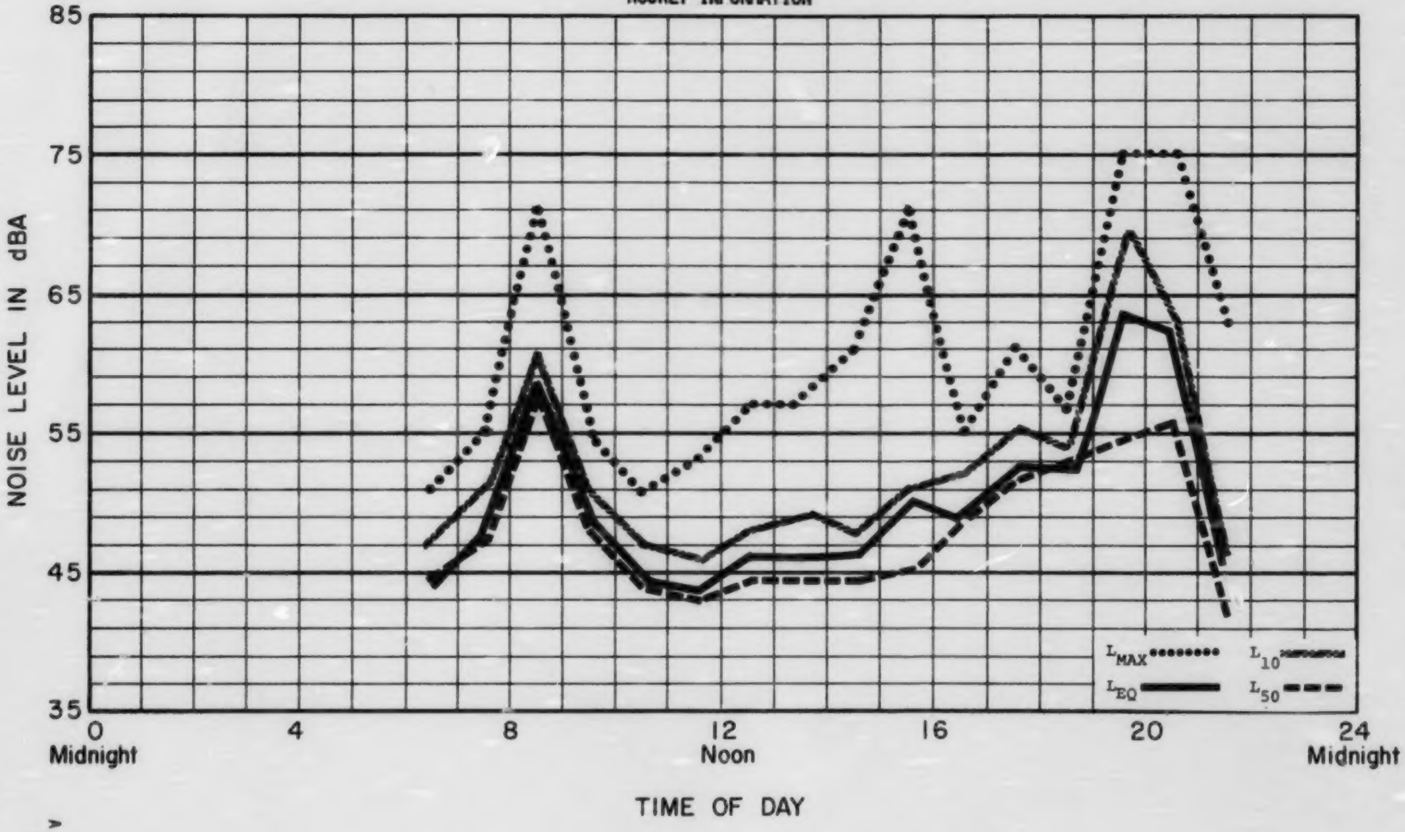
SITE # 1

SUMMARY OF NOISE LEVELS AT S-1 FOR JUNE 21, 1975

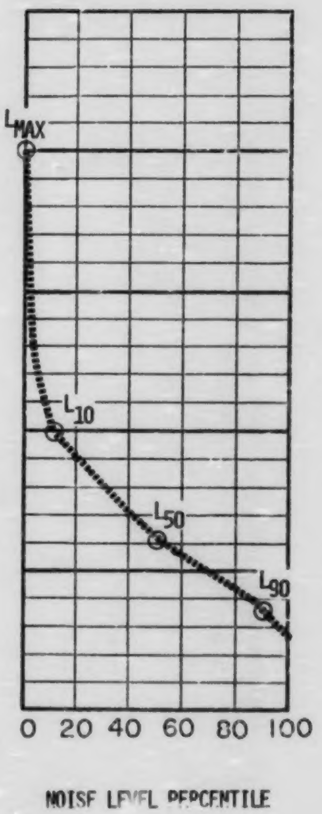
DAILY INFORMATION: L_{MAX} = 75 L_{10} = 56 L_{50} = 47

L_{90} = 42 L_{EQ} = 55 L_{DN} = 55

HOURLY INFORMATION



DAILY NOISE LEVEL DISTRIBUTION

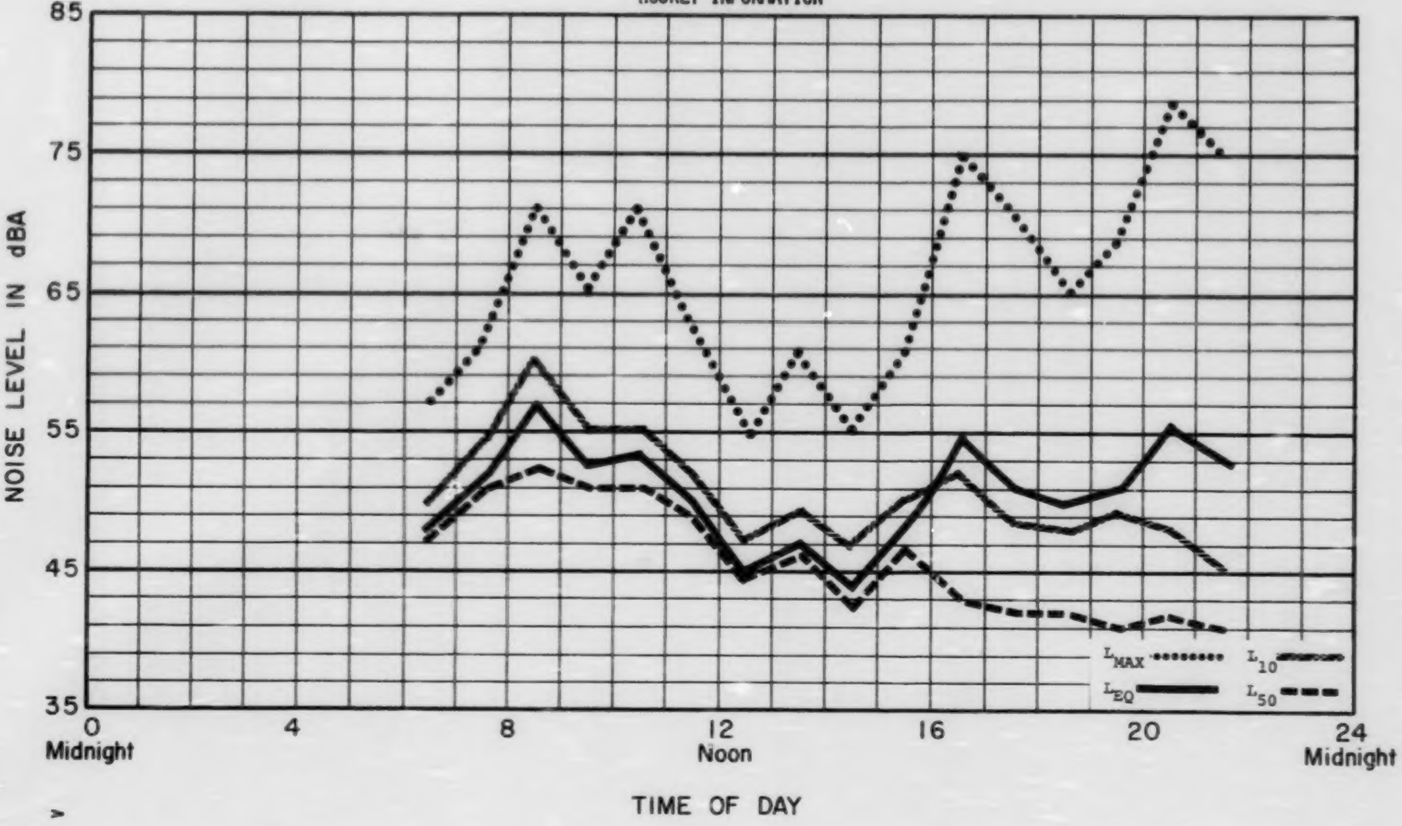


SUMMARY OF NOISE LEVELS AT S-1 FOR JUNE 24, 1975

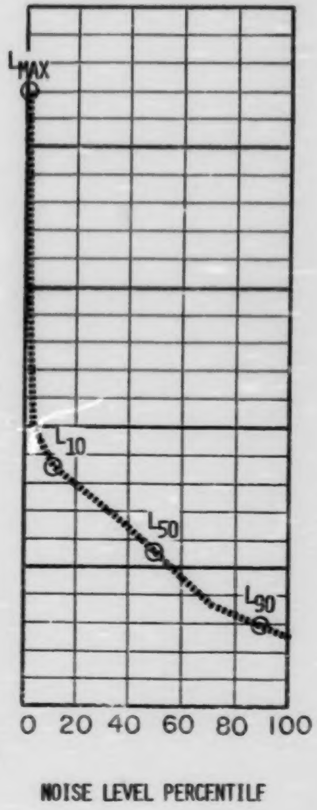
DAILY INFORMATION: L_{MAX} = 79 L_{10} = 53 L_{50} = 46

L_{90} = 41 L_{EQ} = 52 L_{DN} = 53

HOURLY INFORMATION



DAILY NOISE LEVEL DISTRIBUTION



NO. 2 SULLIVAN VILLAGE

I. Site Description

Population:	1972 -	592
(Vicinity Map)	1975 -	676
	1995 -	830

B. Land Use

This is a partially developed area which is essentially residential with amenities such as a park, school and church nearby.

C. Traffic

Normal residential, few trucks and no buses in the vicinity of the site.

Traffic Counts	Location	1975	1995
	1	302	9600
	2	4838	17600

II. Operations

On Sunday, June 22, this site was rained out from 6:00 a.m. to 11:00 a.m. and operated from 11:00 a.m. to 10:00 p.m.. On Monday, June 23, it operated from 6:00 a.m. to 2:00 p.m. , was rained out until 6:00 p.m. and then operated until 10:00 p.m.. On Wednesday, July 30, a one hour check was run from 4:00 to 5:00 p.m..

III. Noise Sources

A. Typical Noise Sources

Primary:	Automobiles, helicopters, planes
Secondary:	Construction, dogs

B. Intrusive Noise Sources

Small planes were the most prevalent source of intrusive noise at this site. However, there was no indication of an unusually high incidence rate or intensity for any sources relative to other sites. The average incidence rate for all sounds above 70 dBA at this site was less than one every two hours.

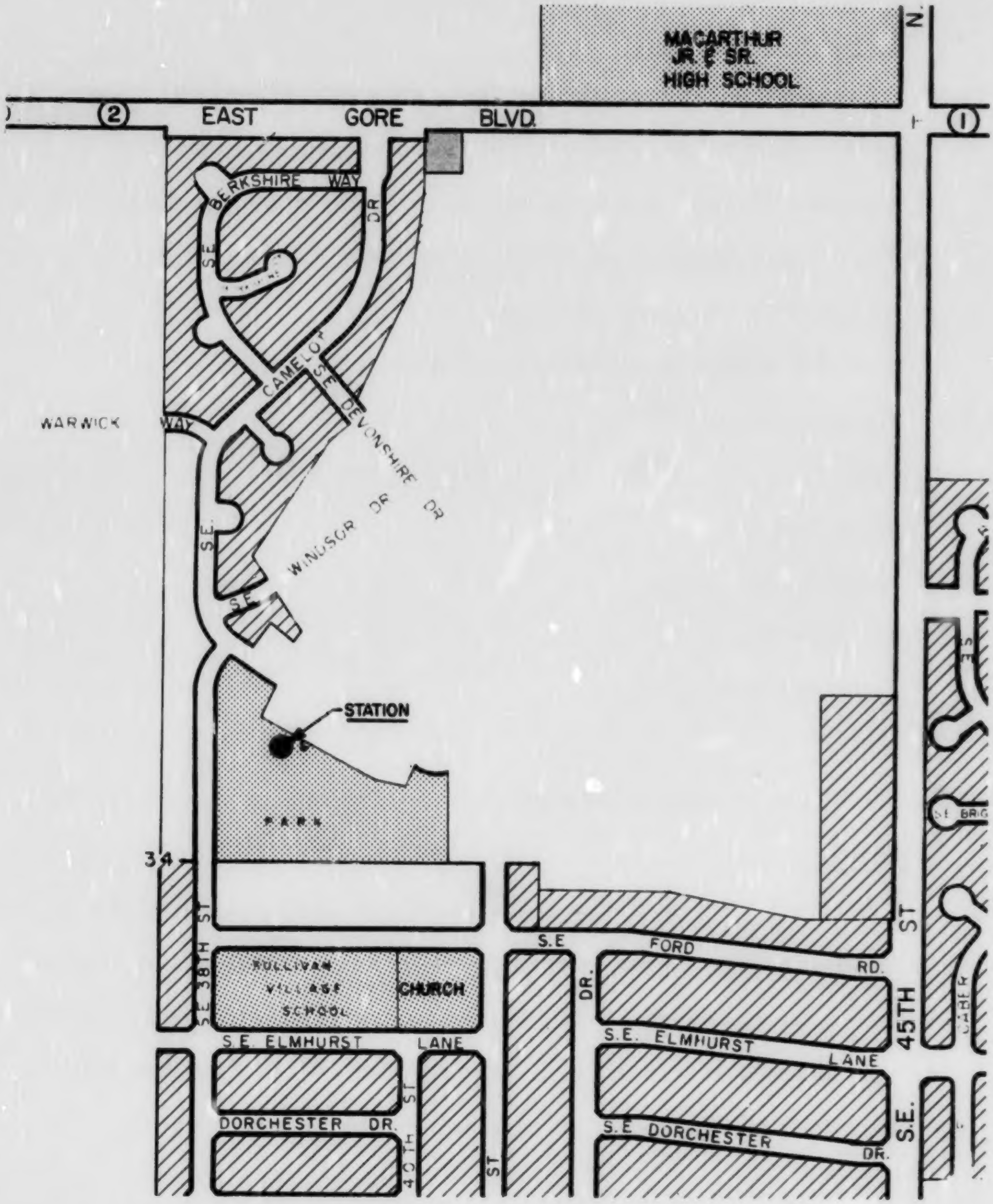
The sources noted during the 24 hours this site operated are tabulated below.

Source	Number over 70 dBA
Small planes	5
Automobiles	1
Motorcycles	2
Construction equipment	1
Total	9

At this site no other sources were noted and no sources exceeded 80 dBA.

IV. Observations

The daily L_{eq} levels of 47 and 51 dBA indicate little probability of an adverse noise impact existing at this site. Probably, at these environmental noise levels, no one would be highly annoyed by noise. The projected population growth of about 20 percent and traffic growth of about 400 percent would probably raise the noise levels, but not result in adverse noise impacts.

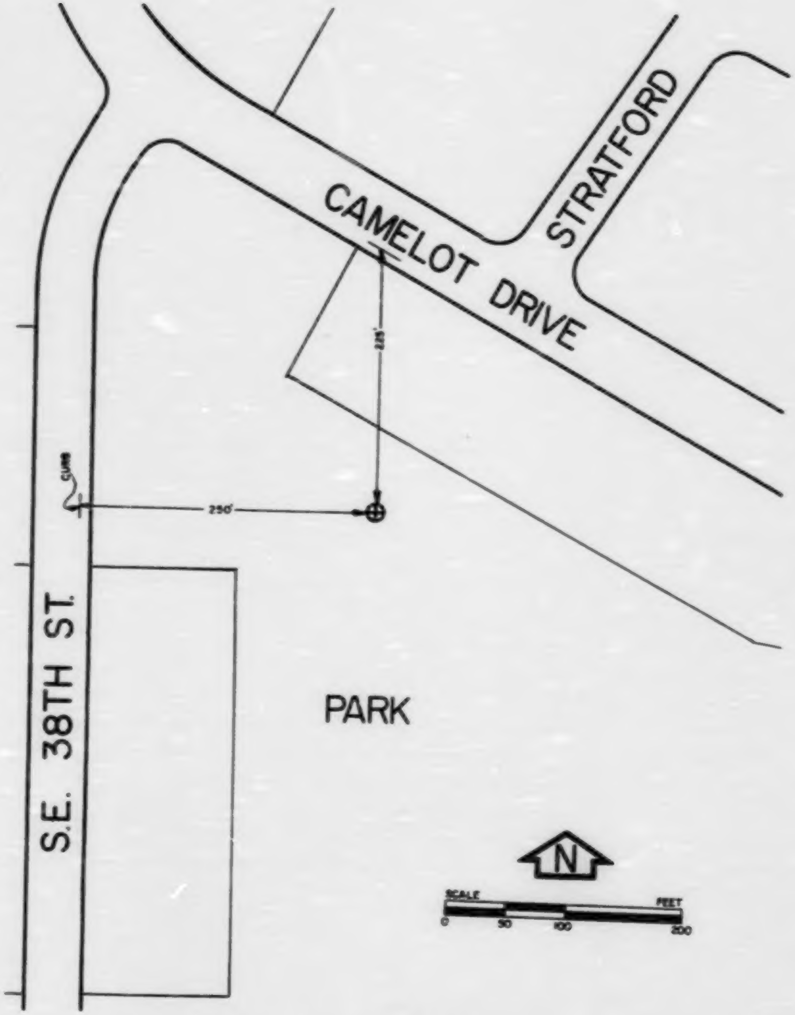

MACARTHUR JR. & SR. HIGH SCHOOL
N.
(2)
EAST GORE BLVD.
(1)
S.E. BERKSHIRE WAY
DR.
S.E.
CAMELOT
S.E. DEVONSHIRE DR.
WARWICK WAY
S.E. WINDSOR DR.
S.E.
STATION
PARK
34
S.E. 38TH ST
S.E. FORD RD.
SULLIVAN VILLAGE SCHOOL
CHURCH
DR.
S.E. ELMHURST LANE
S.E. ELMHURST LANE
DORCHESTER DR.
40TH ST
ST
S.E. DORCHESTER DR.
S.E. 45TH ST
S.E.
S.E. BRIG
SCALE FEET 0 500

VICINITY MAP

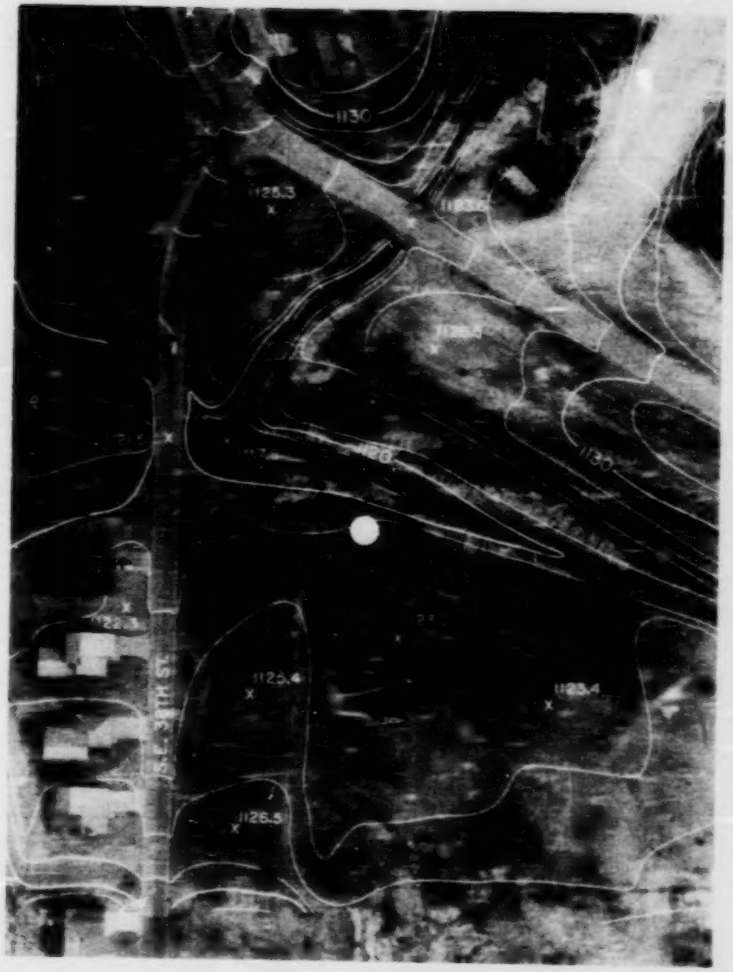
LAND USE

▨ LOW DENSITY RESIDENTIAL
▨ HIGH DENSITY RESIDENTIAL
▨ COMMERICAL
▨ PUBLIC FACILITY
☐ VACANT
■ INDUSTRIAL

SV SITE # 2


CAMELOT DRIVE
STRATFORD
S.E. 38TH ST.
PARK
CURB
250'
225'
N
SCALE
FEET
0
50
100
200

SV SITE # 2


1130
1128.3
1130
1120
1125.4
1123.4
1126.5
S.E. 38TH ST.
N
SCALE
FEET
0
50
100
200

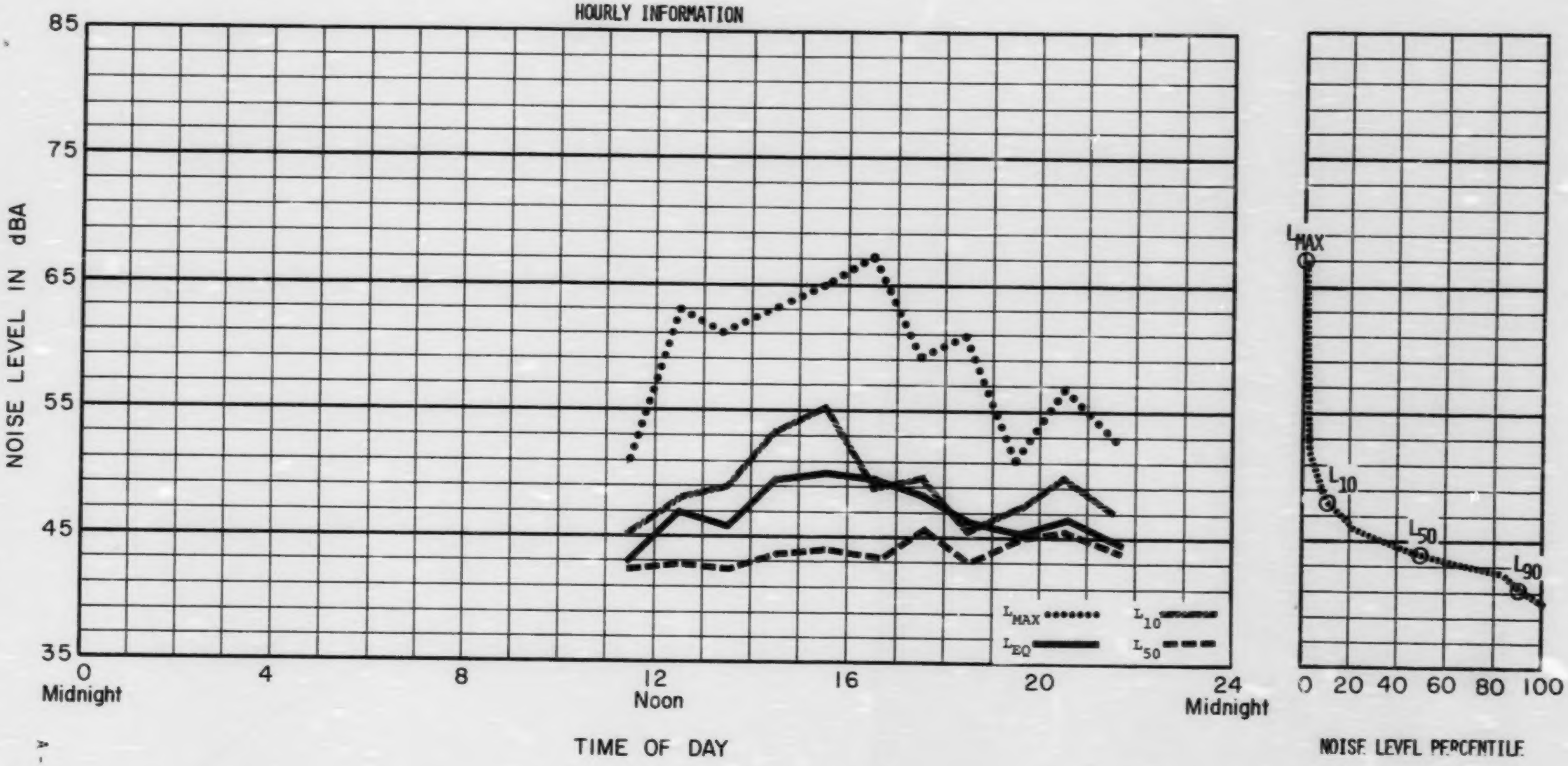
AERIAL PHOTO

SITE # 2

SUMMARY OF NOISE LEVELS AT S-2 FOR JUNE 22, 1975

DAILY INFORMATION: L_{MAX} = 67 L_{10} = 49 L_{50} = 44

L_{90} = 41 L_{EQ} = 47 L_{DN} = 47

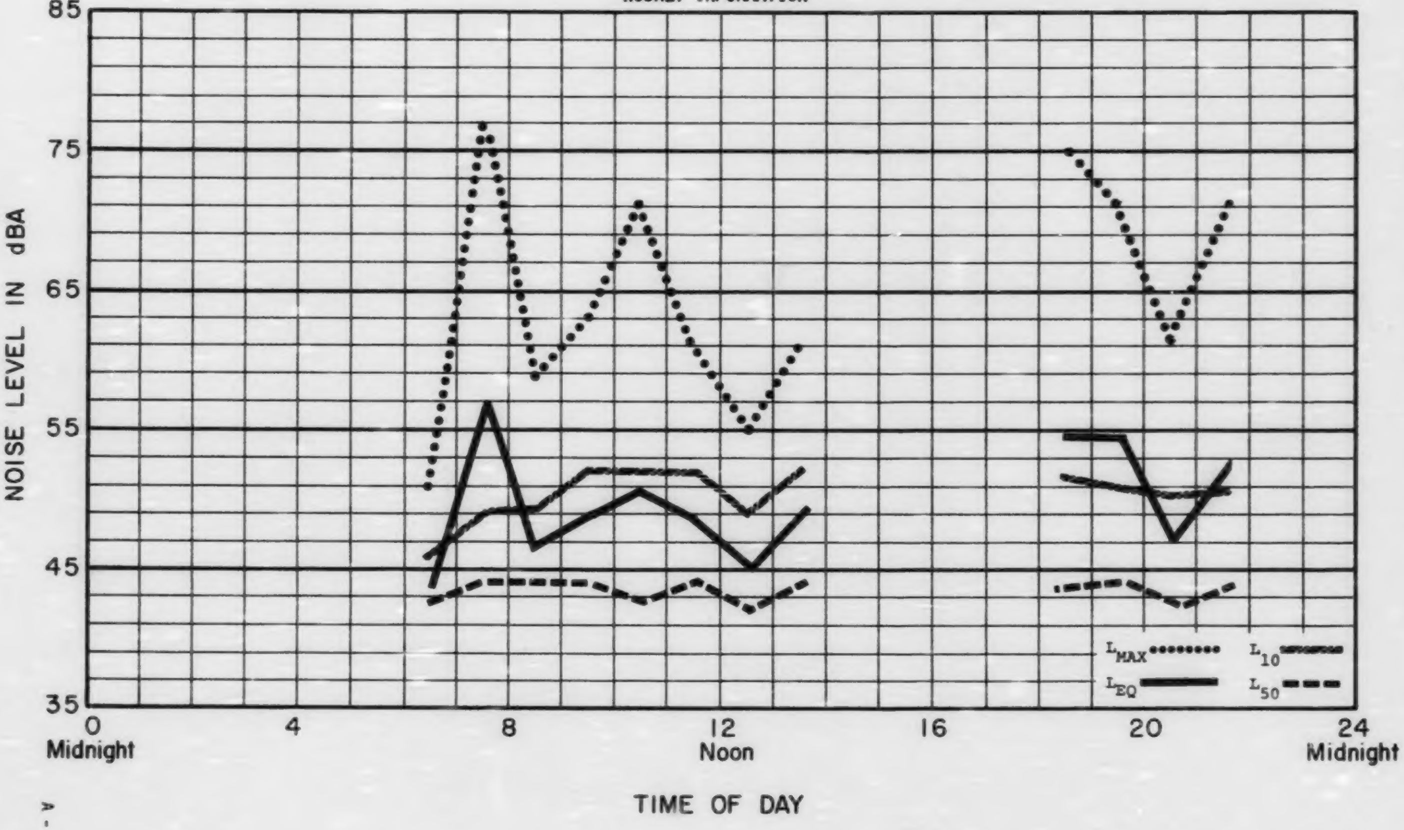


SUMMARY OF NOISE LEVELS AT S-2 FOR JUNE 23, 1975

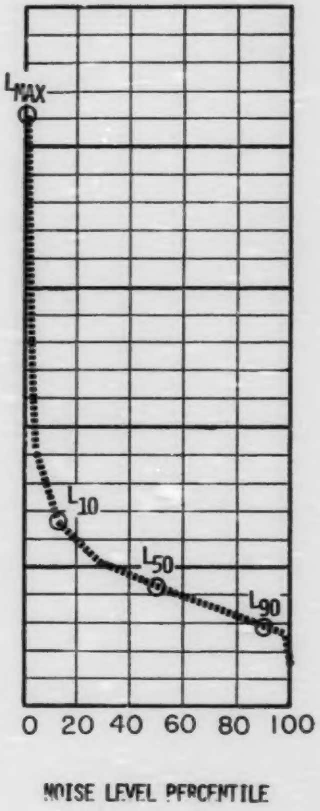
DAILY INFORMATION: L_{MAX} = 77 L_{10} = 51 L_{50} = 43

L_{90} = 41 L_{EQ} = 51 L_{DN} = 51

HOURLY INFORMATION



DAILY NOISE LEVEL DISTRIBUTION

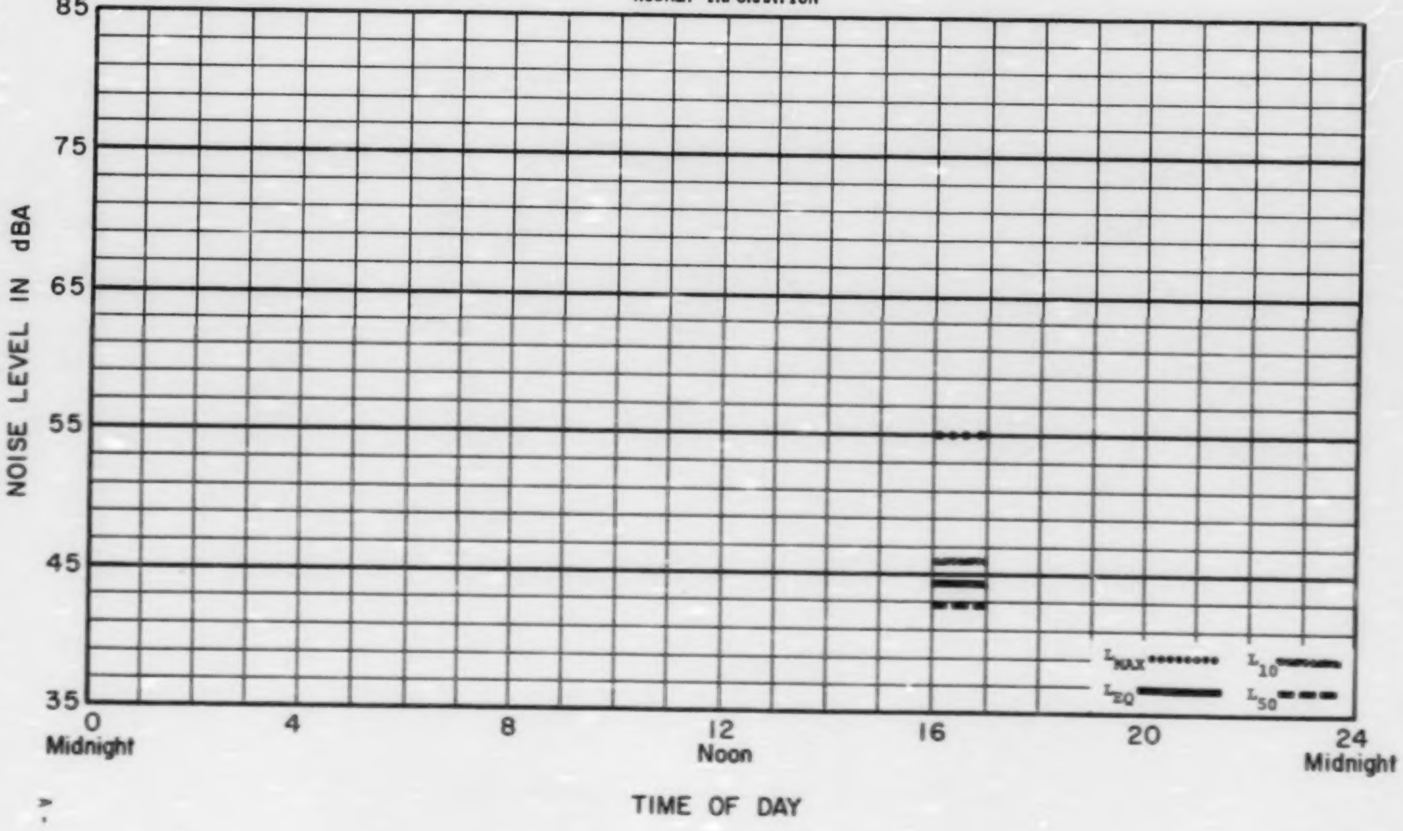


SUMMARY OF NOISE LEVELS AT S-2 FOR JULY 30, 1975

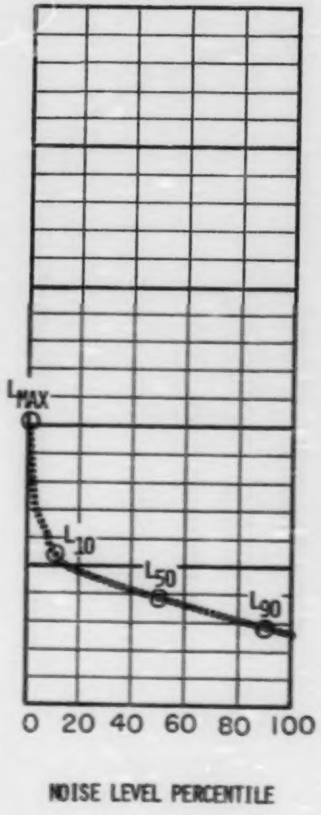
DAILY INFORMATION: $L_{MAX} = 55$ $L_{10} = 46$ $L_{50} = 43$

$L_{90} = 41$ $L_{EQ} = 44$ $L_{DN} = 44$

HOURLY INFORMATION



DAILY NOISE LEVEL DISTRIBUTION



NO. 3 HENRY POST

I. Site Description

A. Population:
(Vicinity Map)

1972 - 511
1975 - 505
1995 - 1028

B. Land Use

This site is in a basically residential neighborhood. There are houses in the immediate vicinity. Highland Cemetery is approximately 250 feet to the south and a large church the same distance to the north east. The southern end of the Henry Post Airfield runway is approximately 1,000 yards to the north.

C. Traffic

Normal residential traffic in the immediate vicinity of the site. Much heavier major arterial traffic 1,000 feet west of the site.

Traffic Counts: (ADT)	Location	1975	1995
	1	20,912	18,000
	2	3,053	19,000
	3	17,441	9,300
	4	20,453	16,800
	5	NA	5,000

II. Operations

This site operated from 6:00 a.m. to 7:00 p.m. on Saturday, June 21, at which time it was rained out. It operated again from 6:00 a.m. to 10:00 p.m. on Tuesday, June 24.

III. Noise Sources

A. Typical Noise Sources

Primary: Automobiles, yard work, small planes

Secondary: Helicopters, motorcycles, household

B. Intrusive Noise Sources

Small planes, helicopters, automobiles, and jets were the most prevalent sources of intrusive noises at this site. All had unusually high incident rates compared to other sites, and the jets produced unusually intense noise levels. The average incidence rate for sounds above 70 dBA was over two per hour. Sound levels from jets frequently exceeded 80 dBA and occasionally exceeded 90 dBA.

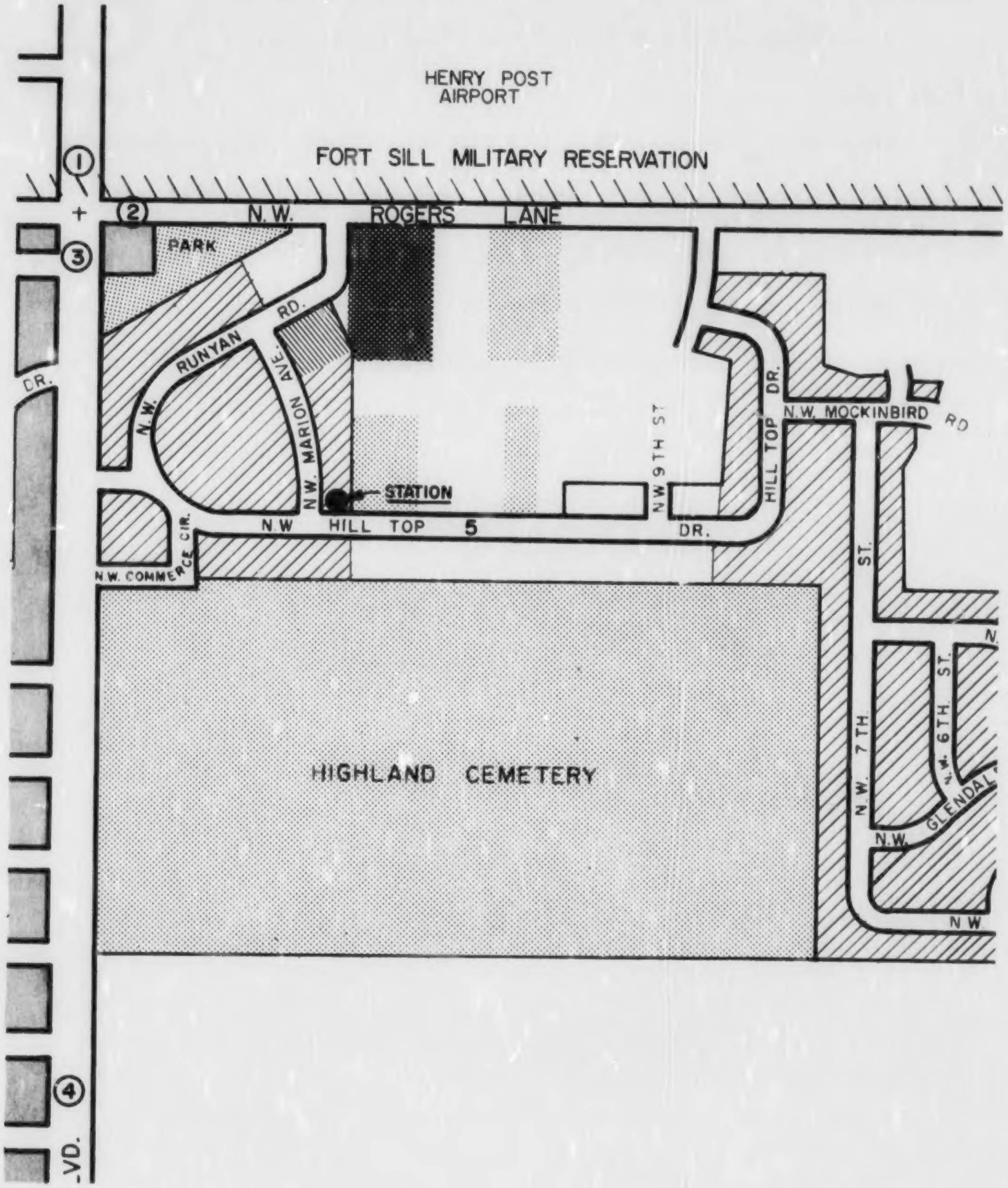
The sources noted during the 30 hours this site was operated are tabulated below.

Source	Over 70 dBA	Over 80 dBA	Over 90 dBA
Jets	8	7	2
Small planes	19	1	0
Helicopters	17	1	0
Automobiles	15	0	0
Motorcycles	5	0	0
Trucks	2	0	0
Railroads	1	0	0
Total	67	9	2

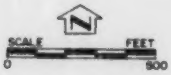
Artillery noise was noted four times at this site.

IV. Observations

The daily L_{eq} levels of 59 and 63 dBA noted at this site indicate a probable adverse noise impact. At these levels, probably over 20 percent of the people are highly annoyed by noise. The noise probably interferes with outdoor activities and also with indoor activities in buildings not properly designed to exclude exterior noise. The projected changes in population and traffic probably would have little effect on noise at this site.


HENRY POST
AIRPORT
FORT SILL MILITARY RESERVATION
①
+
②
③
N.W. ROGERS LANE
PARK
N.W. RUNYAN RD.
N.W. MARION AVE.
DR.
STATION
NW 9TH ST
HILL TOP DR.
N.W. MOCKINBIRD RD
N.W HILL TOP 5 DR.
N.W. COMMERCE CIR.
ST.
N.W. 7TH
N.W. 6TH ST.
N.W. GLENDAL
N.W
N.
HIGHLAND CEMETERY
④
-VD.

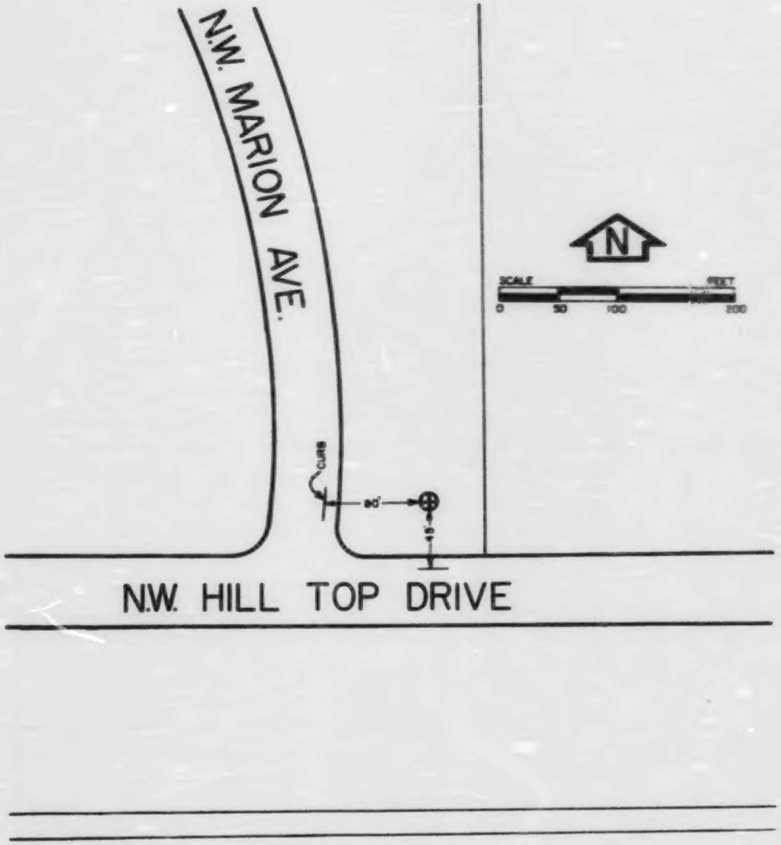
VICINITY MAP


N
SCALE
FEET
0
800

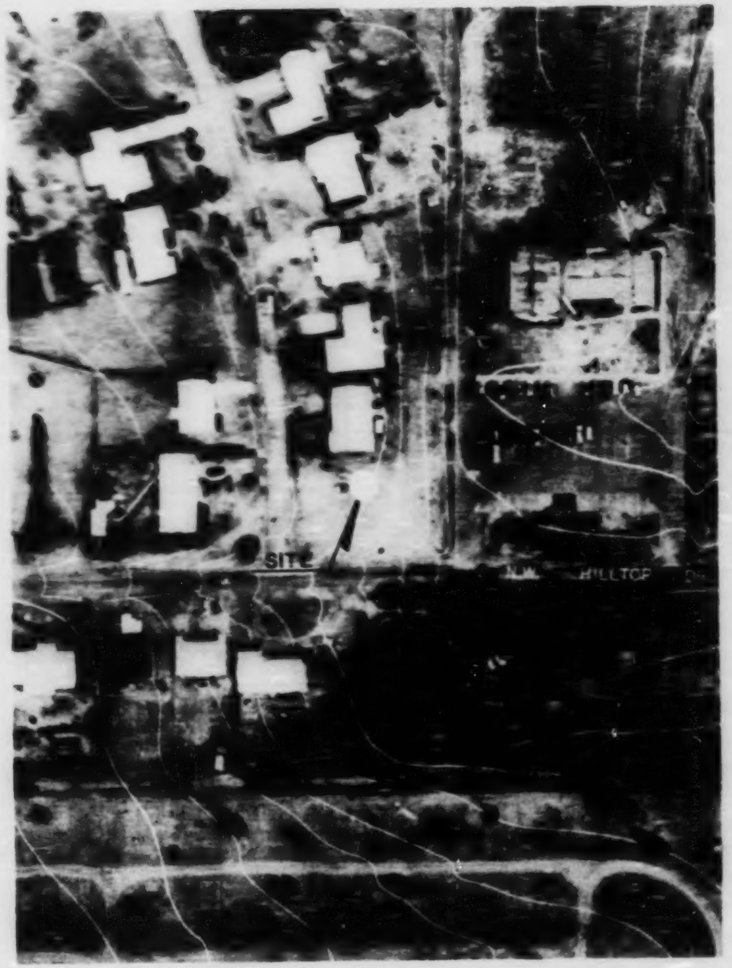
LAND USE

▨ LOW DENSITY RESIDENTIAL
▨ HIGH DENSITY RESIDENTIAL
▨ COMMERICAL
▨ PUBLIC FACILITY
☐ VACANT
■ INDUSTRIAL

HP SITE # 3


N.W. MARION AVE.
N.W. HILL TOP DRIVE
CURB
80'
15'
N
SCALE
FEET
0
50
100
200

HP SITE # 3


SITE
N.W. HILLTOP Dr

AERIAL PHOTO

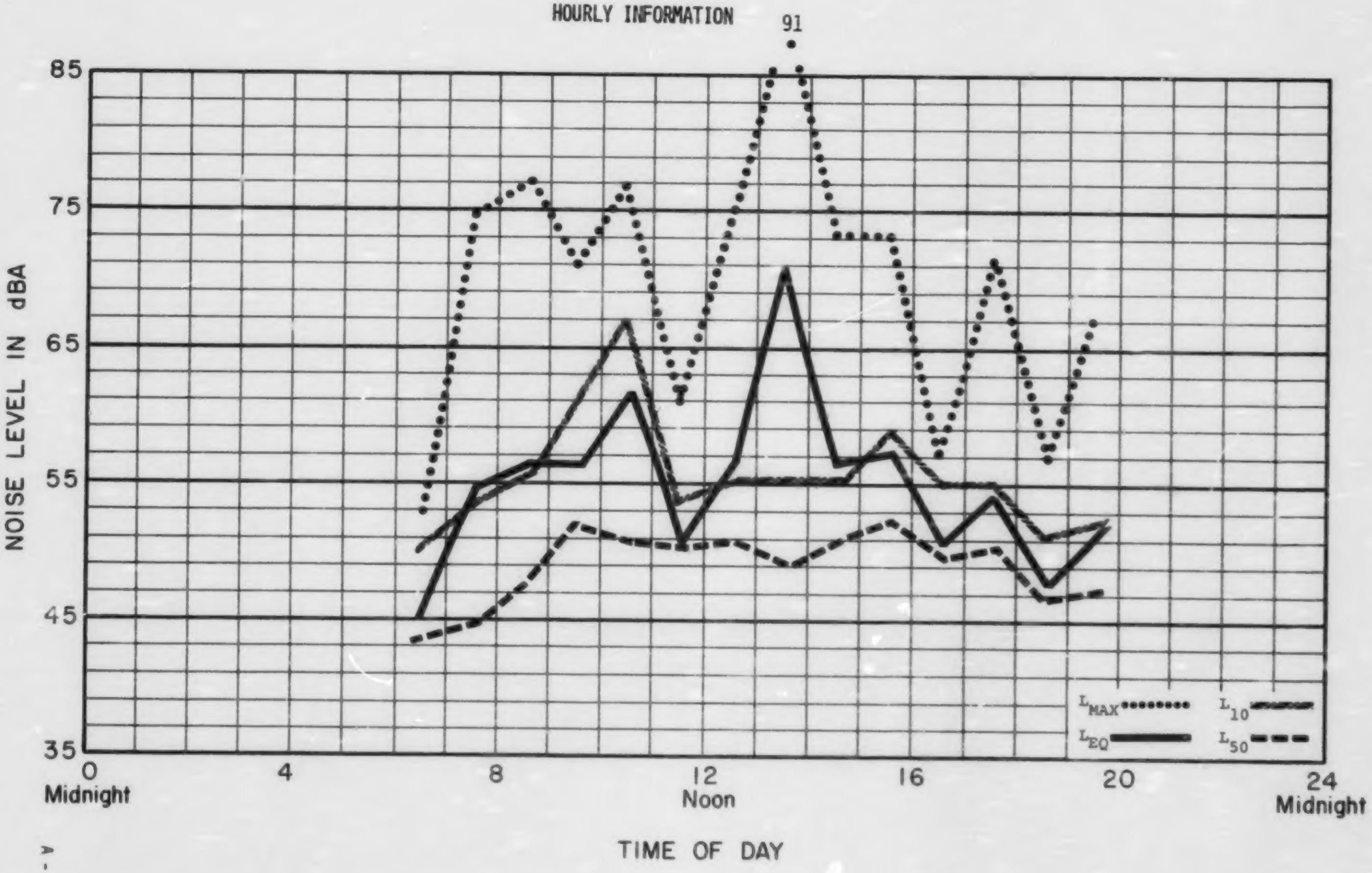
N
SCALE
FEET
0
50
100
200

SITE # 3

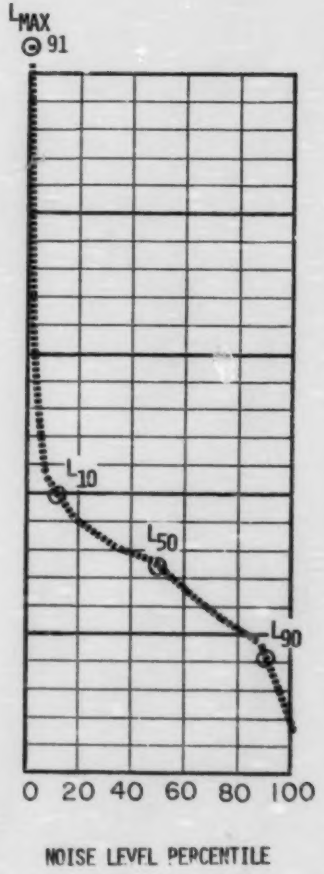
SUMMARY OF NOISE LEVELS AT S-3 FOR JUNE 21, 1975

DAILY INFORMATION: L_{MAX} = 91 L_{10} = 55 L_{50} = 50
L_{90} = 44 L_{EQ} = 59 L_{DN} = 59

HOURLY INFORMATION



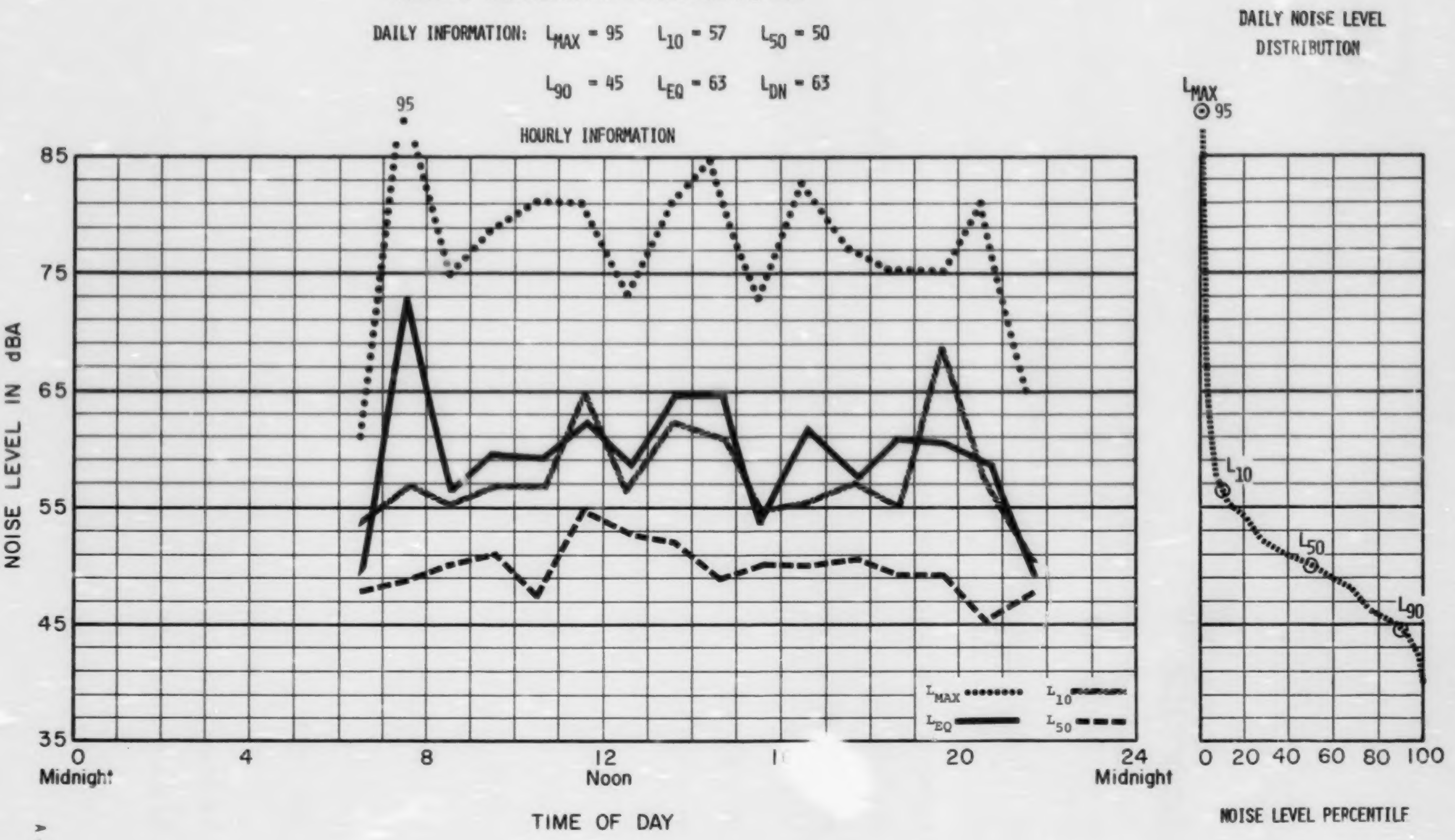
DAILY NOISE LEVEL DISTRIBUTION



SUMMARY OF NOISE LEVELS AT S-3 FOR JUNE 24, 1975

DAILY INFORMATION: L_{MAX} = 95 L_{10} = 57 L_{50} = 50

L_{90} = 45 L_{EQ} = 63 L_{DN} = 63



NO. 4 MUNCIPAL AIRPORT

I. Site Description

A. Population: (Vicinity Map)

1972	-	1581
1975	-	1348
1995	-	1100

B. Land Use

This site is in the center of a quarter section that is predominantly residential with many vacant lots. The north end of the principal runway of Lawton Muncipal Airport is eight-tenths of one mile south of the site which is directly under the north-south landing approach. FHA has projected an 115 CNR contour through the area. There is some light industrial (warehouses) some 800 feet to the north and west of the site.

C. Traffic

There is light residential traffic in the immediate vicinity, and heavy major arterial traffic 1500 feet north of the site.

Traffic Counts:	Location	1975	1995
(ADT)	1	1562	3100
	2	1034	5200
	3	4786	9200
	4	NA	3500

II. Operations

This site was scheduled for 24 hour operation on Sunday, June 22, and Monday, June 23. It was rained out from 1:00 a.m. to 8:00 a.m. on Sunday and from 3:00 p.m. to 8:00 p.m. on Monday. A check operation was run from 11:00 a.m. to 4:00 p.m. on Thursday, July 3, a period which included aircarrier operations scheduled daily.

III. Noise Sources

A. Typical Noise Sources

Primary:	Automobiles, Dogs, Light planes
Secondary:	Loudspeakers, jets, household

Intrusive Noise Sources

Jets, small planes, and automobiles were the most prevalent sources of intrusive noises. While there was no indication of an unusually high incidence rate for any of these sources relative to other sites, the intensity of sound produced by jet aircraft was extremely high, frequently exceeding 90 dBA and occasionally 100 dBA. The average incidence rate of all sounds exceeding 70 dBA at this site was about two every three hours.

The sources noted during the 38 hours this site was operated are tabulated below.

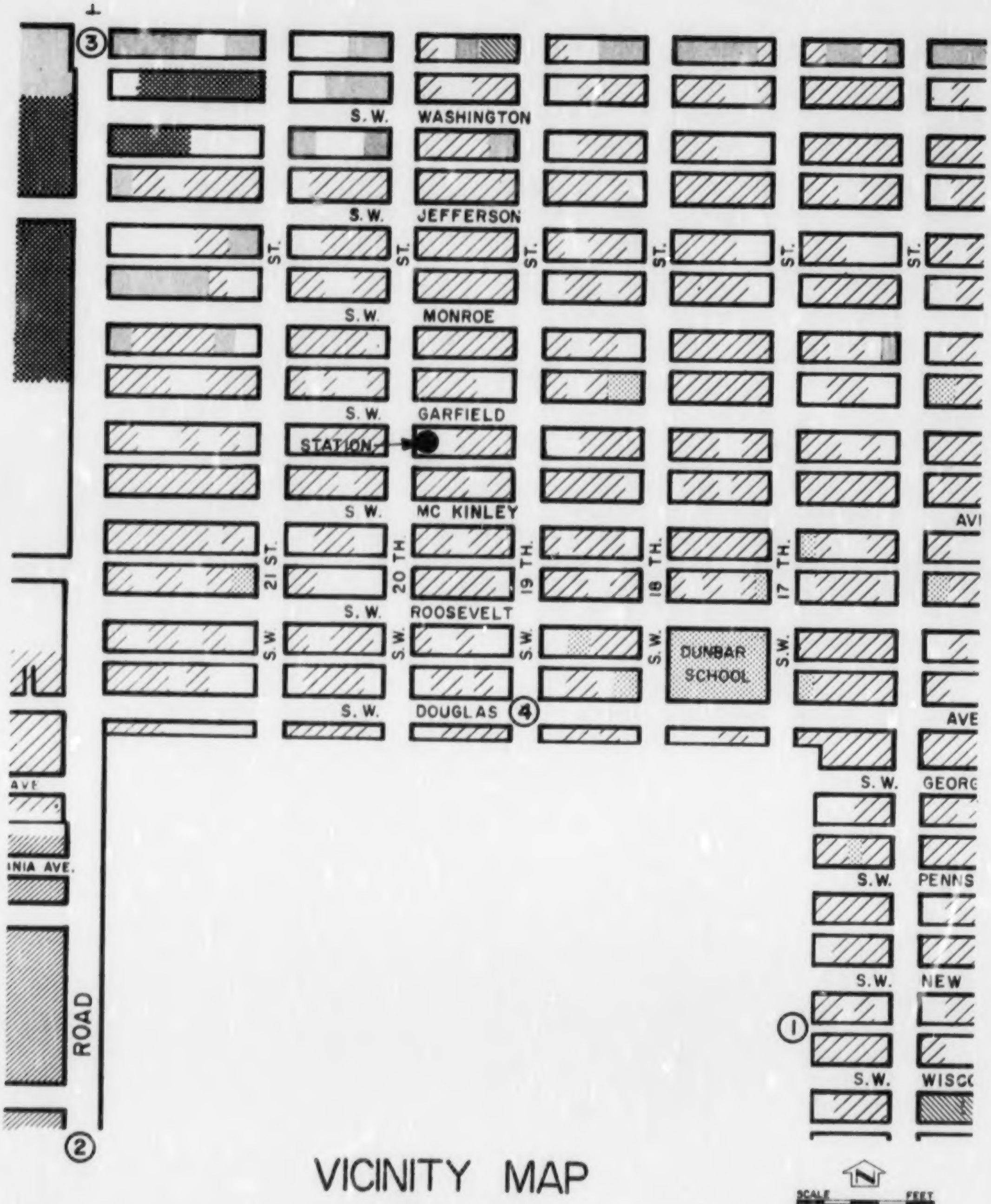
Source	Over 70 dBA	Over 80 dBA	Over 90 dBA
Jets	7	5	5
Small Planes	8	3	0
Helicopters	2	0	0
Automobiles	4	1	0
Trucks	1	0	0
Household Equipment	1	0	0
Dogs	2	0	0
Loudspeakers	1	0	0
Total	26	9	5

Artillery was noted at this site six times.

IV. Observations

The daily L_{eq} levels of 64, 69, and 70 dBA noted at this site indicate a probable adverse noise impact exists. These high levels are due almost entirely to the noise of a few jet aircraft. The levels correspond approximately with CNR values between 100 and 105 which are less than the 115 predicted, but are based on limited data and do not reflect the effect of any forecasted expansion of airport operations. For example, a doubling of current jet operations or the introduction of noisier jets could easily raise these values three to five decibels.

At the observed levels, probably over 30 per cent of the people are highly annoyed by noise. The noise probably interferes with outdoor activities and also with indoor activities in buildings not properly designed to exclude exterior noise. The projected changes in population and vehicular traffic would have little effect on the noise at this site since it is dominated by the sound of aircraft operations.

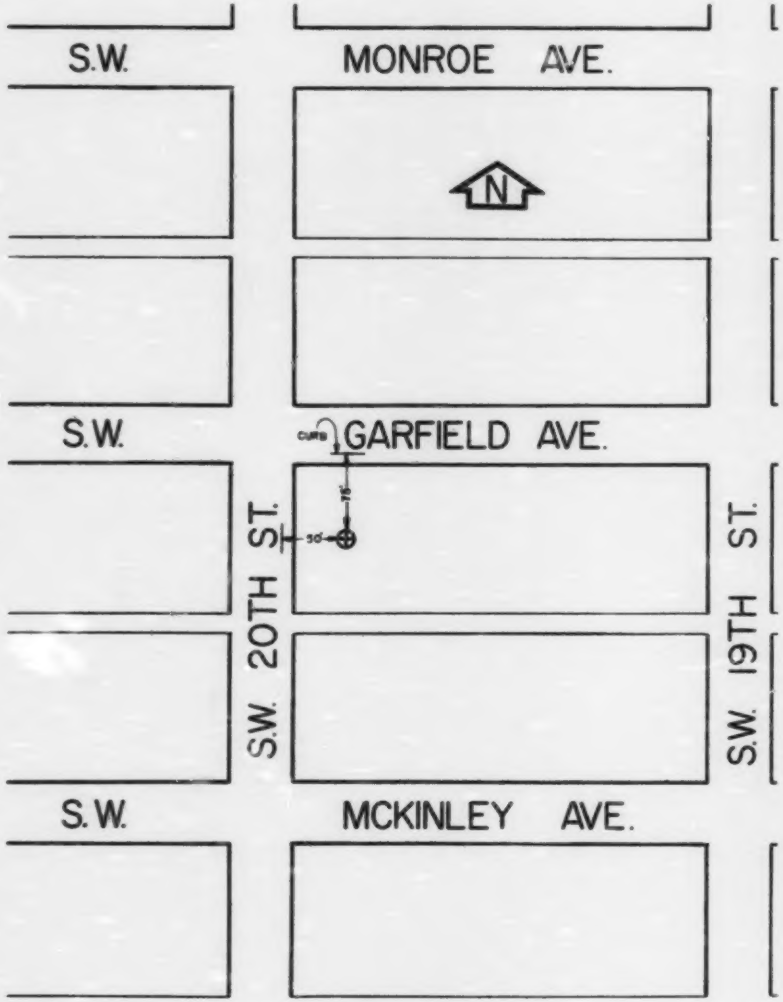

③
S.W. WASHINGTON
S.W. JEFFERSON
S.W. MONROE
S.W. GARFIELD
STATION
S.W. MC KINLEY
S.W. ROOSEVELT
S.W. DOUGLAS
④
S.W. 21 ST.
S.W. 20 TH. ST.
S.W. 19 TH. ST.
S.W. 18 TH. ST.
S.W. 17 TH. ST.
ST.
DUNBAR SCHOOL
AVE
S.W. GEORG
S.W. PENNS
S.W. NEW
S.W. WISC
①
AVE
NIA AVE.
ROAD
②
N
SCALE FEET
0 500

VICINITY MAP

LAND USE

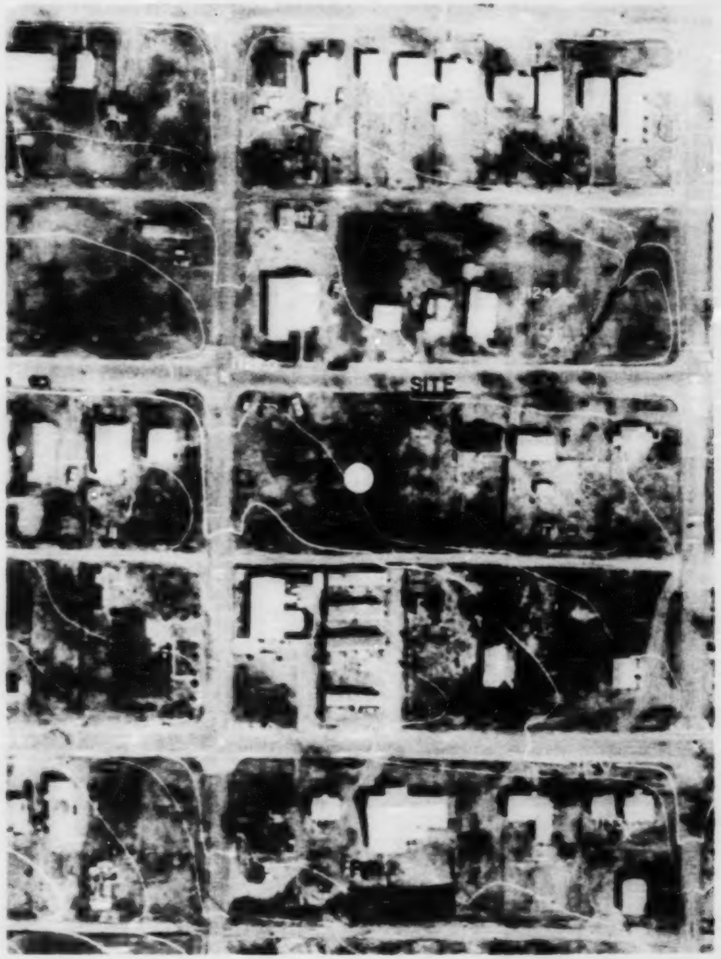
▨ LOW DENSITY RESIDENTIAL
▩ HIGH DENSITY RESIDENTIAL
▭ COMMERICAL
░ PUBLIC FACILITY
☐ VACANT
▦ INDUSTRIAL

MA SITE # 4


S.W. MONROE AVE.
S.W. GARFIELD AVE.
S.W. MCKINLEY AVE.
S.W. 20TH ST.
S.W. 19TH ST.
N
CURB
75'
50'

MA SITE # 4

SCALE
FEET
0
50
100
200


SITE

AERIAL PHOTO

N
SCALE
FEET
0
50
100
200

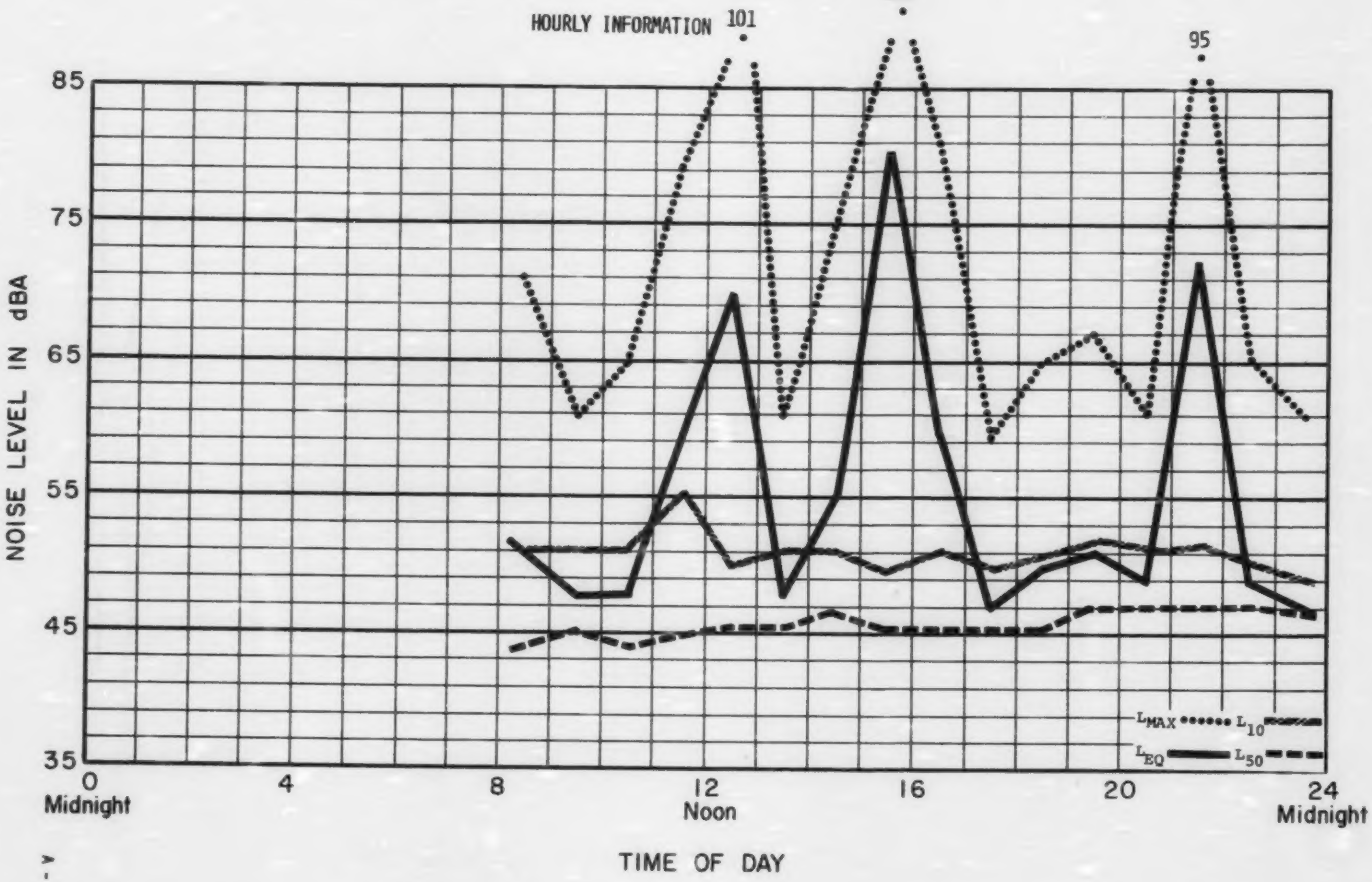
SITE # 4

SUMMARY OF NOISE LEVELS AT S-4 FOR JUNE 22, 1975

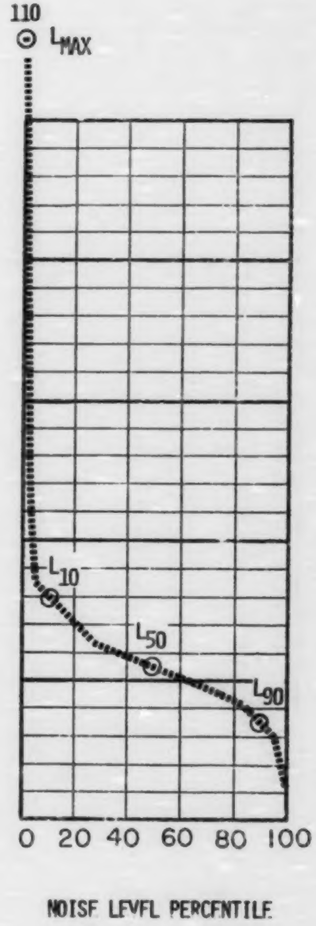
DAILY INFORMATION: L_{MAX} = 110 L_{10} = 51 L_{50} = 46

L_{90} = 42 L_{EQ} = 69 L_{DN} = 69

HOURLY INFORMATION



DAILY NOISE LEVEL DISTRIBUTION



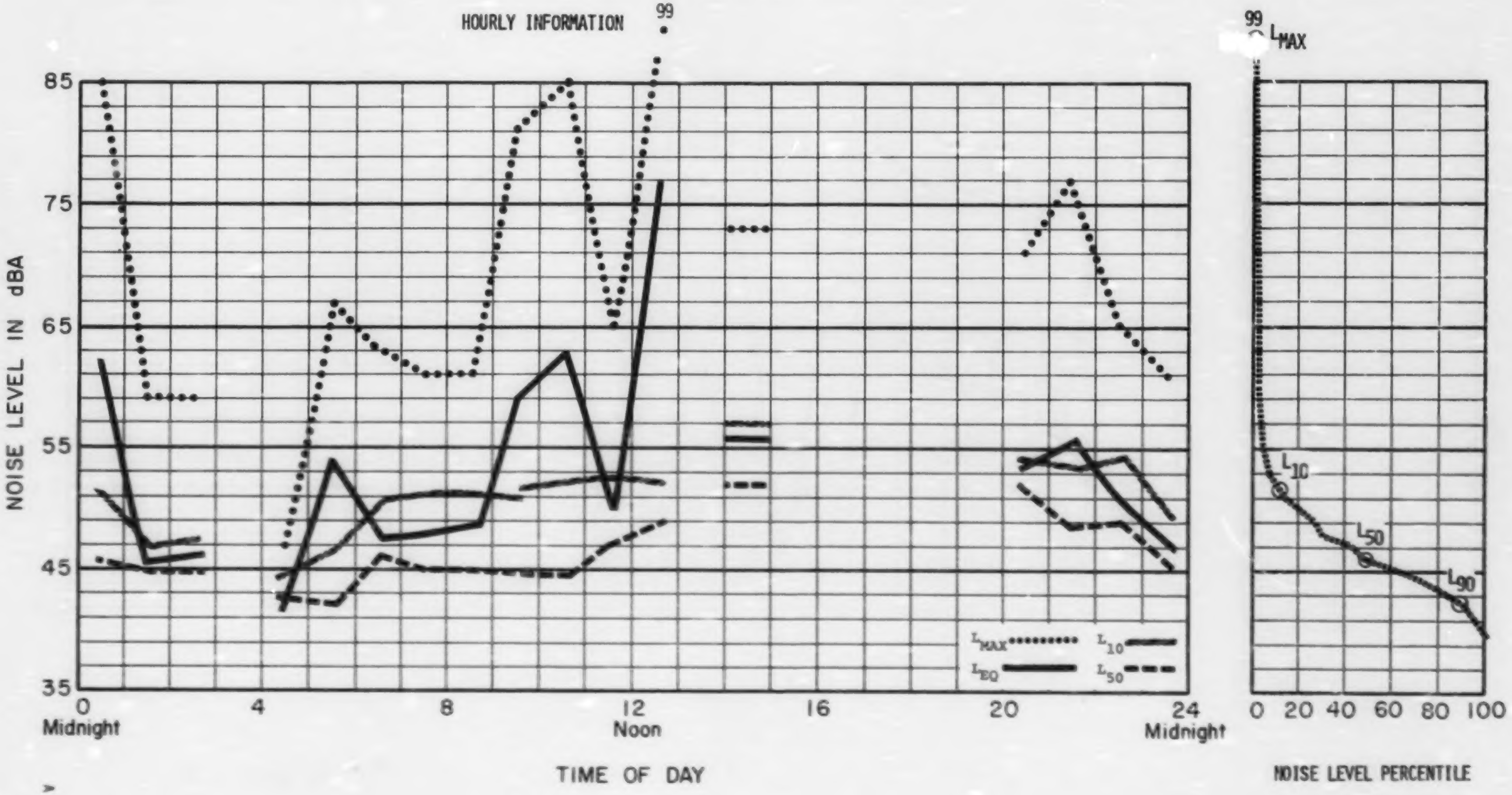
SUMMARY OF NOISE LEVELS AT S-4 FOR JUNE 23, 1975

DAILY INFORMATION: L_{MAX} = 99 L_{10} = 52 L_{50} = 46

L_{90} = 42 L_{EQ} = 64 L_{DN} = 65

HOURLY INFORMATION

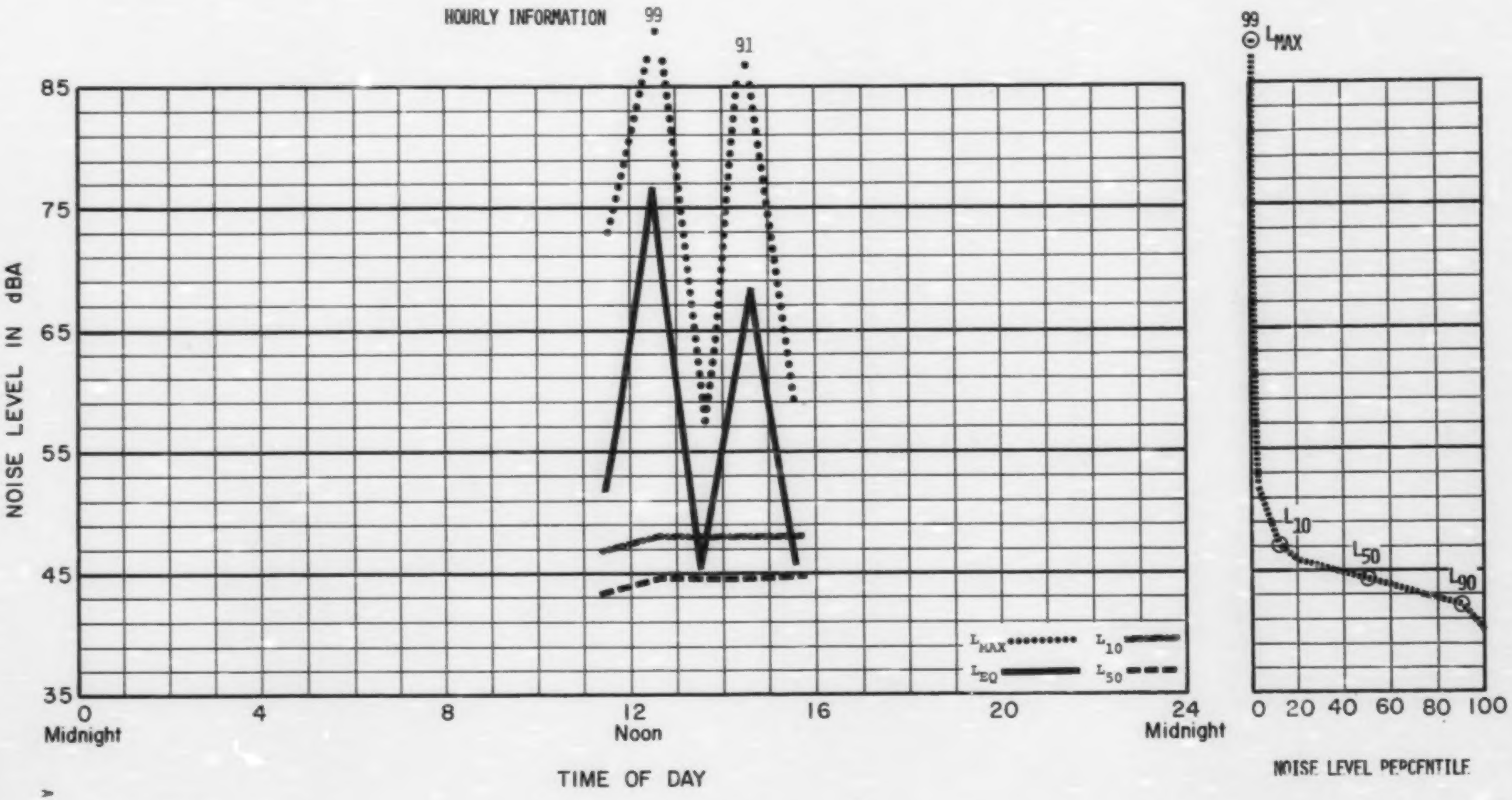
DAILY NOISE LEVEL DISTRIBUTION



SUMMARY OF NOISE LEVELS AT S-4 FOR JULY 3, 1975

DAILY INFORMATION: $L_{MAX} = 99$ $L_{10} = 48$ $L_{50} = 44$

$L_{90} = 42$ $L_{EQ} = 70$ $L_{DN} = 70$



HOURLY INFORMATION

DAILY NOISE LEVEL DISTRIBUTION

NO. 5 CACHE ROAD

I. Site Description

A. Population

Population (Vicinity Map)	1972 -	2779
	1975 -	2642
	1995 -	2787

B. Land Use

Although in a dedicated park, this site is greatly affected by the noise from Cache Road, a major 4 lane east-west arterial some 400 feet south of the site. A municipal fire station is between the site and Cache Road which is bordered by strip commercial development. A well developed residential neighborhood lies to the north-west, north, and north-east of the site.

C. Traffic

Hourly traffic counts at Location 5 during operating hours at this site were:

Time	Sun. June 22	Mon, June 23
6:00 - 7:00 a.m.	-	683
7:00 - 8:00 a.m.	-	1441
8:00 - 9:00 a.m.	-	1288
9:00 - 10:00 a.m.	883	1547
10:00 - 11:00 a.m.	1073	1543
11:00 - 12:00 a.m.	1348	1975
12:00 - 1:00 p.m.	2080	2435
1:00 - 2:00 p.m.	2189	2347
2:00 - 3:00 p.m.	2063	2240
3:00 - 4:00 p.m.	2052	2308
4:00 - 5:00 p.m.	2054	3326
5:00 - 6:00 p.m.	2116	3567
6:00 - 7:00 p.m.	1980	2742
7:00 - 8:00 p.m.	1996	2094
8:00 - 9:00 p.m.	1817	1792
9:00 -10:00 p.m.	1759	1845
	23,410	33,173

II. Operations

This station was scheduled to operate from 6:00 a.m. to 10:00 p.m. on Sunday June 23 and Monday, June 24, 1975. It was rained out from 6:00 a.m. to 9:00 a.m. on Sunday, June 23.

III. Noise Sources

A. Typical noise sources

Primary:	Automobiles
Secondary:	Motorcycles, trucks, dogs, planes

B. Intrusive Noise sources

Emergency vehicles were the most prevalent source of intrusive noise at this site. There was no indication of an unusually high incidence rate or intensity for any source at this site relative to other sites. The average incidence rate for all sounds over 70 dBA at this site was one every two hours.

The sources noted during the 28 hours this site was operated are tabulated below.

Source	Over 70 dBA	Over 80 dBA
Jets	1	0
Small Planes	2	0
Automobiles	3	1
Motorcycles	2	0
Trucks	2	1

B. Intrusive Noise Sources (Cont.)

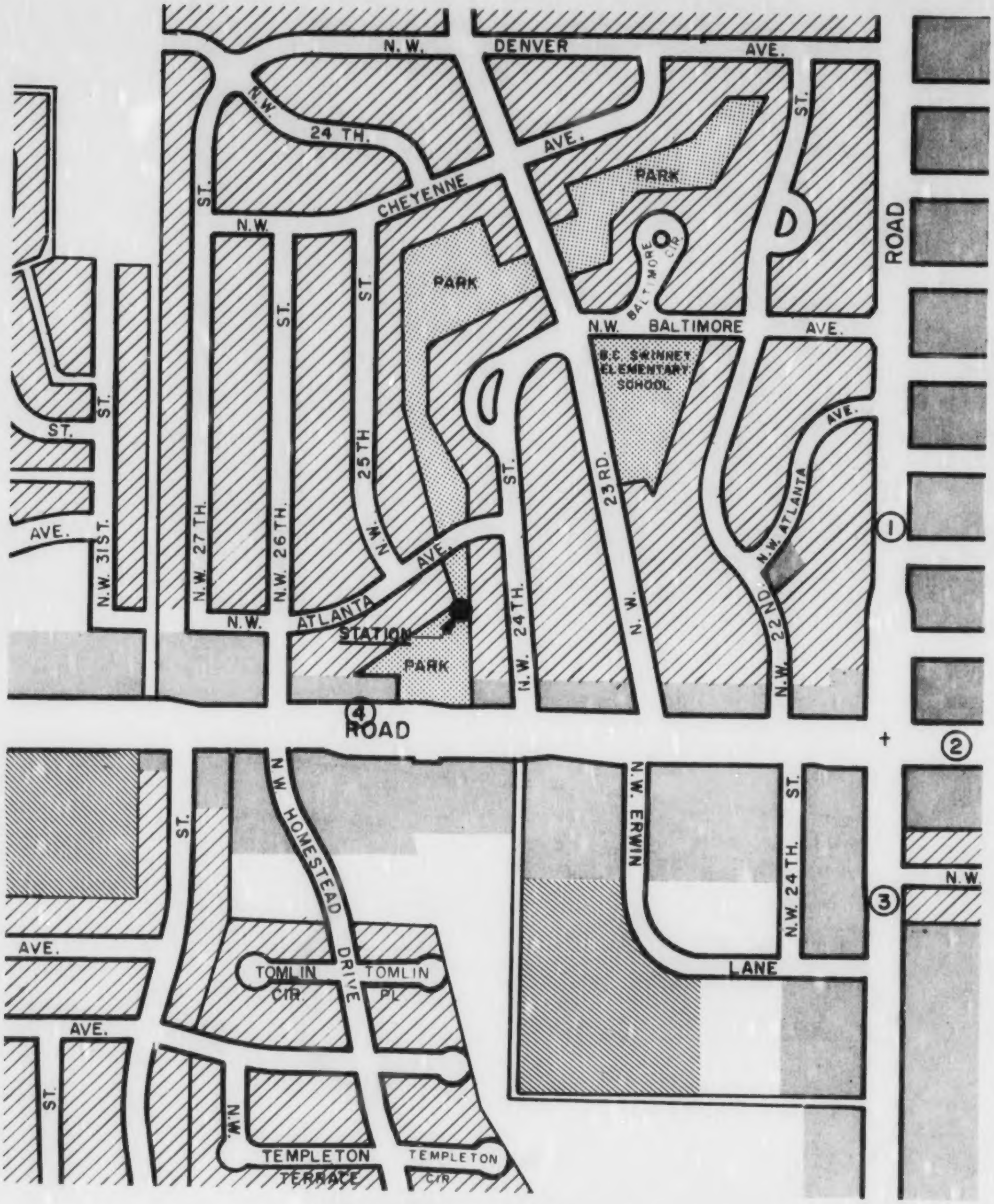
Sources	Over 70 dBA	Over 80 dBA
Emergency Vehicles	4	0
Dogs	5	0
Total	19	2

The high level of noise produced by dogs should be discounted since this site was unavoidably located within 80 feet of a dog's yard. Artillery noise was noted twice at this site.

IV. Observations

The daily L_{eq} levels of 58 and 54 dBA indicate little probability of an adverse noise impact at this site. Less than 15 percent of the people are probably highly annoyed by noise at these levels.

The projected changes in traffic volume and population should have little effect upon these noise levels.

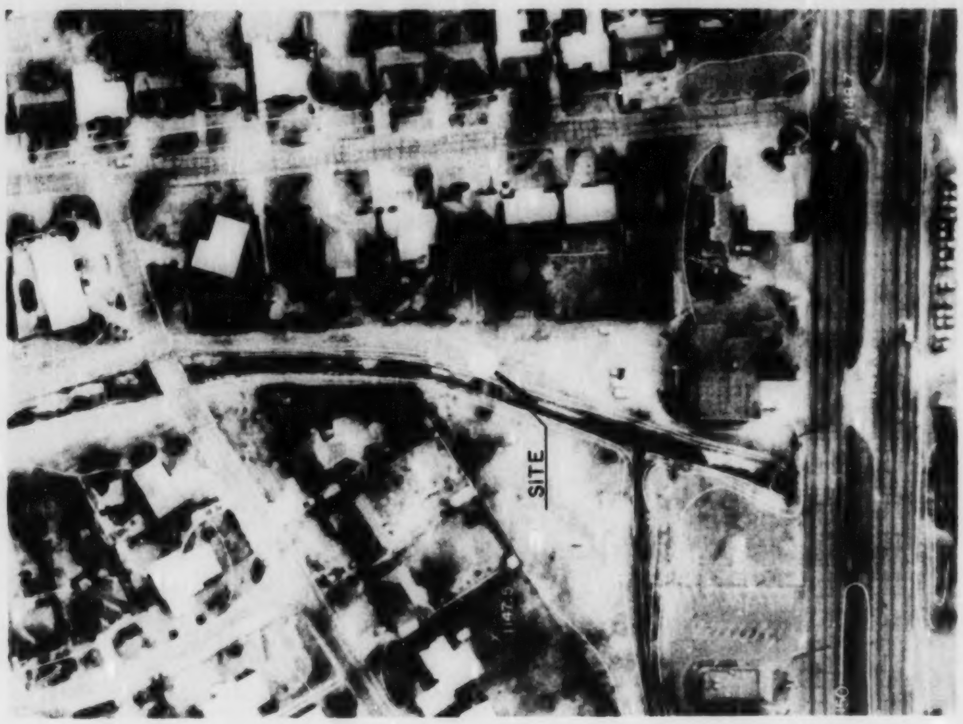

N.W. DENVER AVE.
N.W. 24 TH. ST.
CHEYENNE AVE.
PARK
ST.
ROAD
N.W. 25TH ST.
PARK
BALTIMORE CIR.
N.W. BALTIMORE AVE.
B.C. SKINNER ELEMENTARY SCHOOL
ST.
ST.
AVE.
N.W. 31ST.
N.W. 27 TH.
N.W. 26TH.
N.W. 24TH. ST.
N.W. 23RD.
N.W. ATLANTA AVE.
N.W. 22ND.
①
N.W. ATLANTA AVE.
STATION
PARK
④
ROAD
②
N.W. HOMESTEAD DRIVE
ST.
N.W. ERWIN
N.W. 24TH. ST.
③
N.W.
LANE
AVE.
TOMLIN CIR.
TOMLIN PL.
AVE.
ST.
N.W.
TEMPLETON TERRACE
TEMPLETON CIR.
N
SCALE FEET
0 500

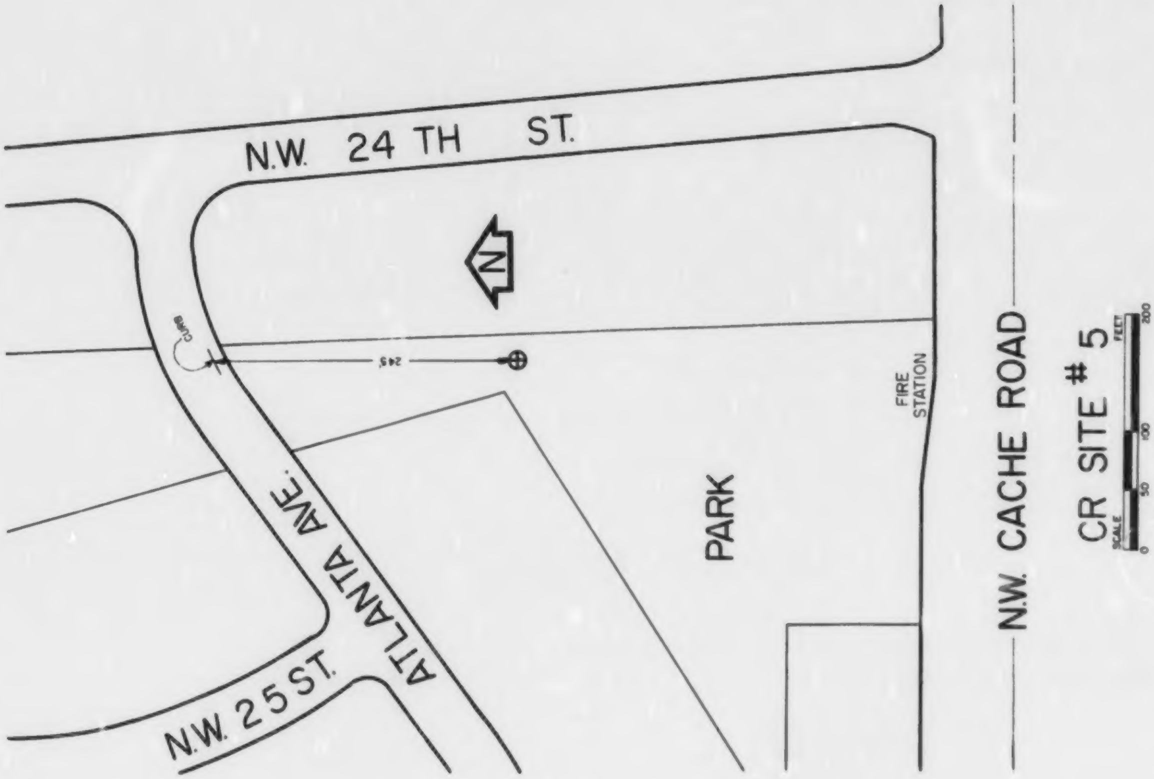
VICINITY MAP

LAND USE

▨ LOW DENSITY RESIDENTIAL
▨ HIGH DENSITY RESIDENTIAL
▒ COMMERICAL
░ PUBLIC FACILITY
☐ VACANT
▩ INDUSTRIAL

CR SITE # 5


SITE


N.W. 24 TH ST.
N.W. 25 ST.
ATLANTA AVE.
CURB
245'
N
PARK
FIRE STATION
N.W. CACHE ROAD
SCALE
0
50
100
200
FEET

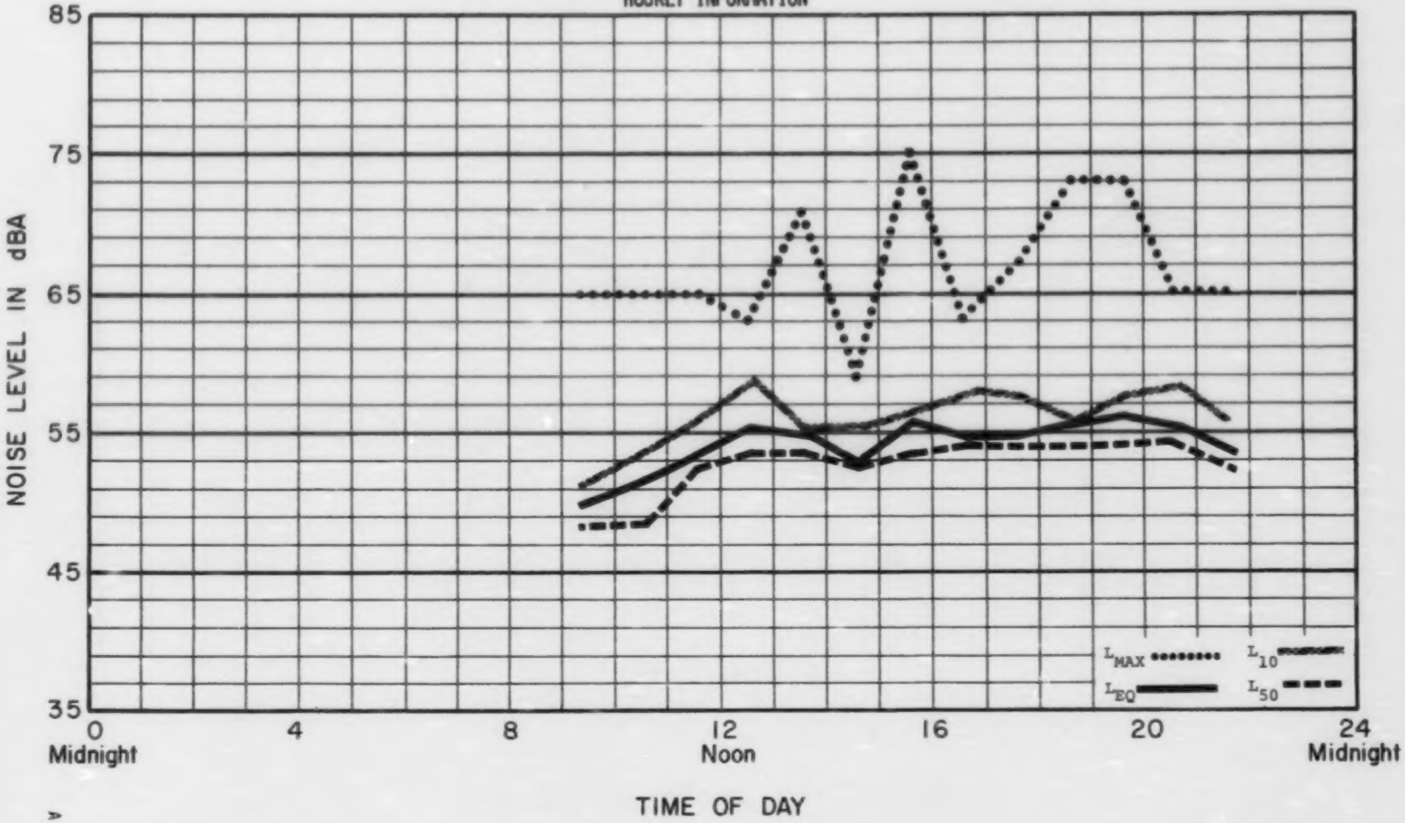
CR SITE # 5

SUMMARY OF NOISE LEVELS AT S-5 FOR JUNE 22, 1975

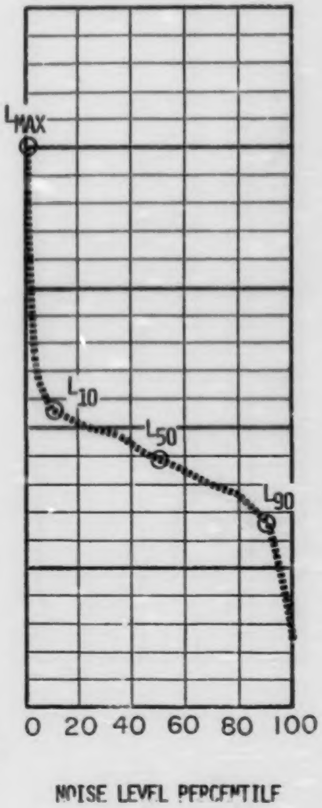
DAILY INFORMATION: L_{MAX} = 75 L_{10} = 56 L_{50} = 53

L_{90} = 48 L_{EQ} = 54 L_{DN} = 54

HOURLY INFORMATION



DAILY NOISE LEVEL DISTRIBUTION

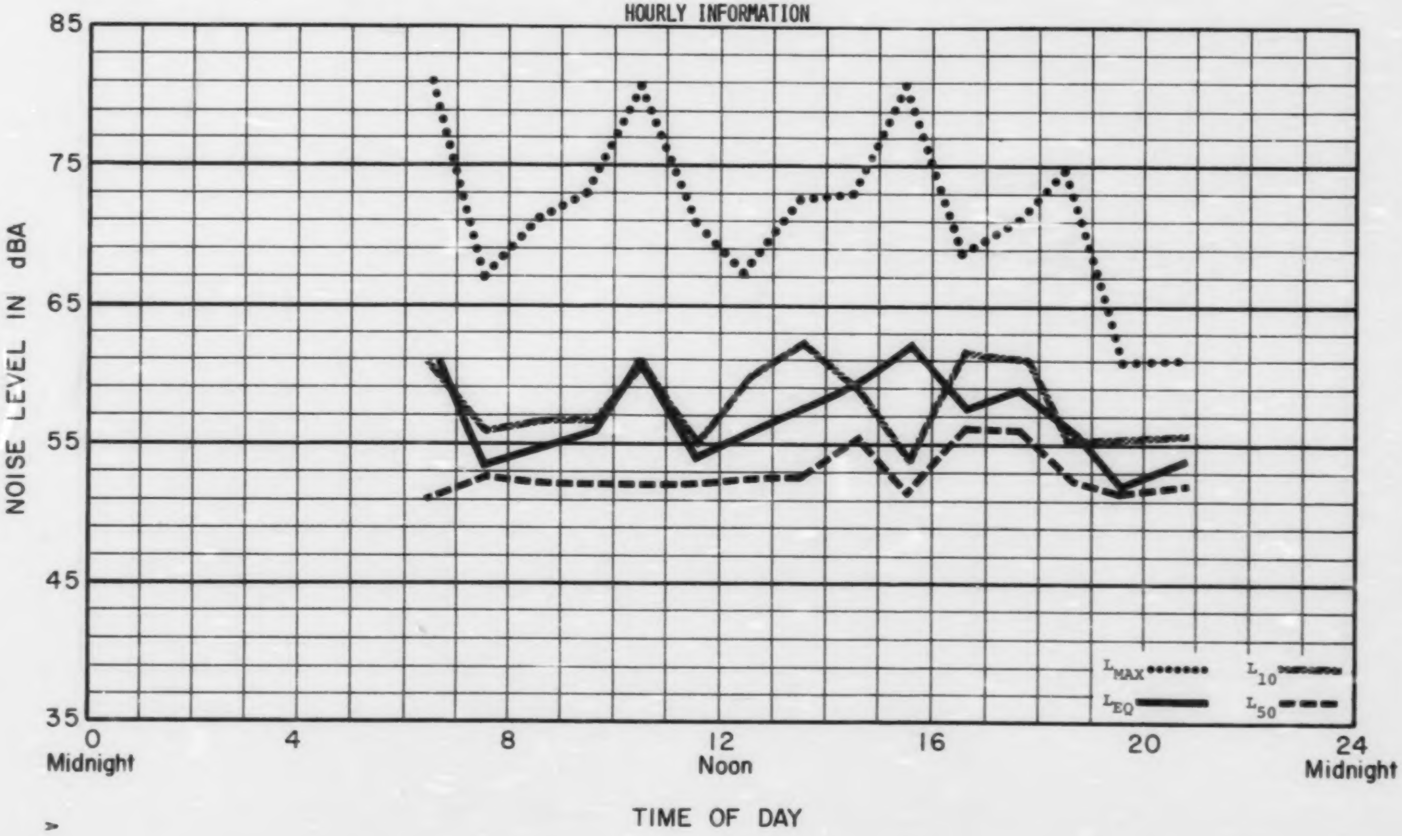


SUMMARY OF NOISE LEVELS AT S-5 FOR JUNE 23, 1975

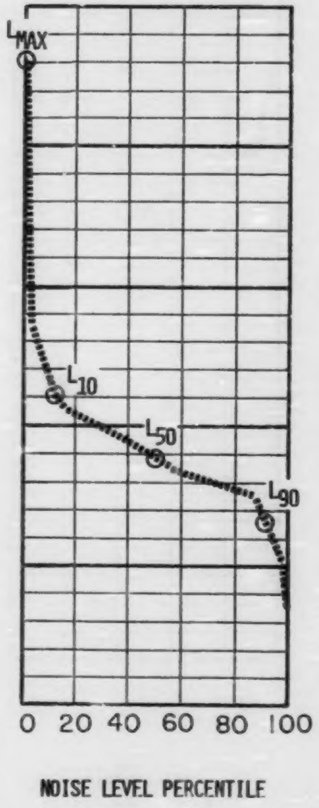
DAILY INFORMATION: $L_{MAX} = 81$ $L_{10} = 59$ $L_{50} = 53$

$L_{90} = 49$ $L_{EQ} = 58$ $L_{DN} = 58$

HOURLY INFORMATION



DAILY NOISE LEVEL DISTRIBUTION



NO. 6 UNIVERSITY

I. Site Description

A. Population: (Vicinity Map)

1972 - 1389
1975 - 1359
1995 - 1208

B. Land Use

This site is in the north-east corner of Cameron University Campus. The heavily traveled 4 lane arterial 250 feet to the north separates the site from the County Hospital. Land use to the east, north-east, and north-west is residential.

C. Traffic

Heavy traffic including trucks and a few buses was observed on Gore Boulevard. Summer classes at Cameron University generated automobile traffic on University Drive on Monday, June 23.

Traffic Counts:	Location	1975	1995
(ADT)	1	16,170	19,100
	2	10,165	21,400
	3	12,643	19,300

II. Operations

This site was scheduled to operate from 7:00 a.m. to 11:00 p.m. on Sunday, June 22 and Monday, June 23. It was rained out from 6:00 a.m. to 10:00 a.m. on Sunday and 3:00 p.m. to 6:00 p.m. on Monday.

III. Noise Sources

A. Typical Noise Sources

Primary:	Automobiles
Secondary:	Trucks, motorcycles

B. Intrusive Noise Sources

There was no indication of an unusually high incidence rate or intensity for any noise source at this site. The average incidence rate of all sounds over 70 dBA at this site was only one in five hours.

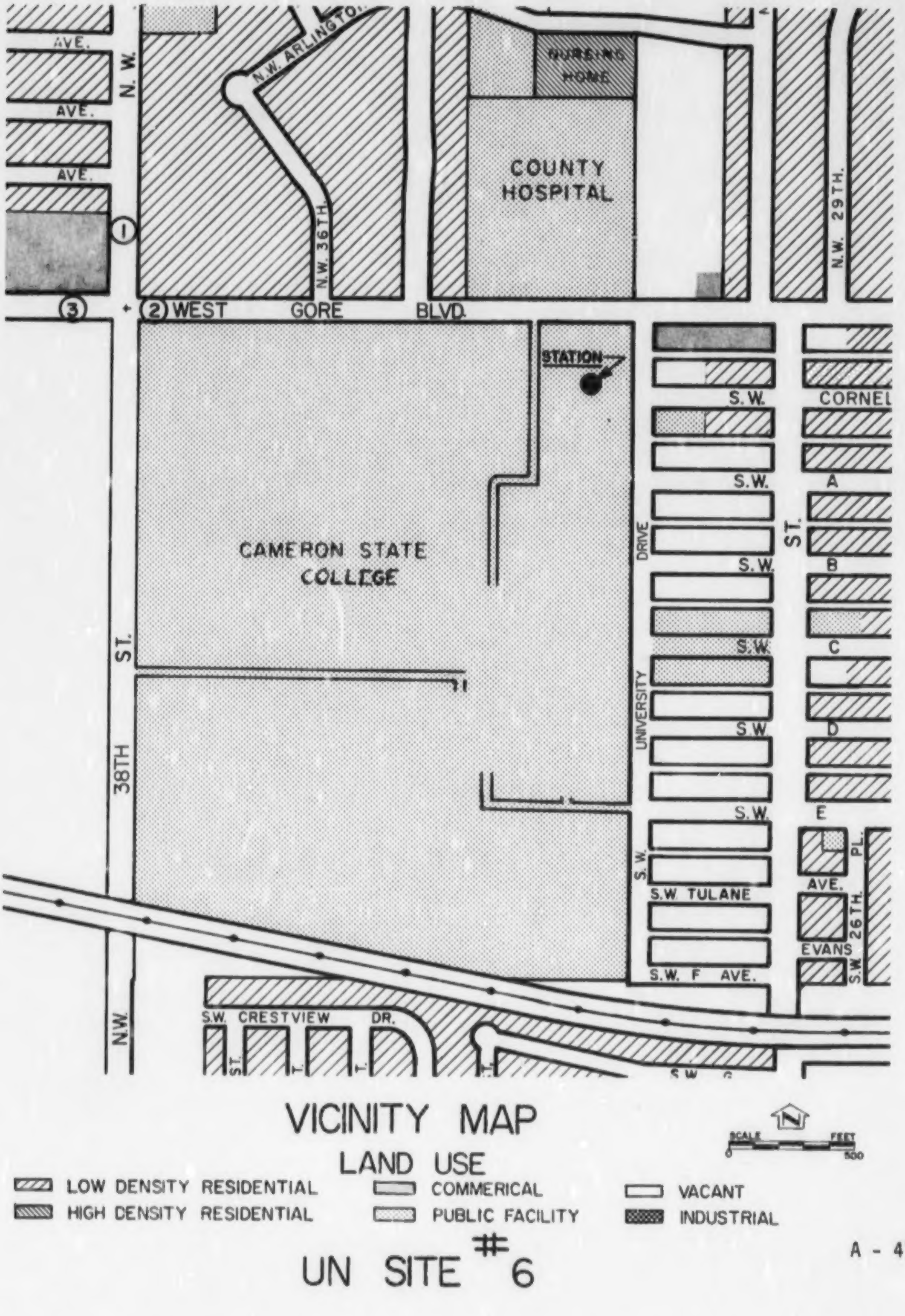
The sources noted during the 25 hours this site was operated are tabulated below.

Source	Over 70 dBA	Over 80 dBA
Jets	2	1
Small Planes	1	0
Automobiles	1	0
Trucks	1	0
Total	5	1

No other sources were noted at this site.

IV. Observations

The daily L_{eq} values of 52 and 55 dBA indicate that no adverse noise impact exists at this site. Less than ten percent of the people are probably highly annoyed at these levels of environmental noise.

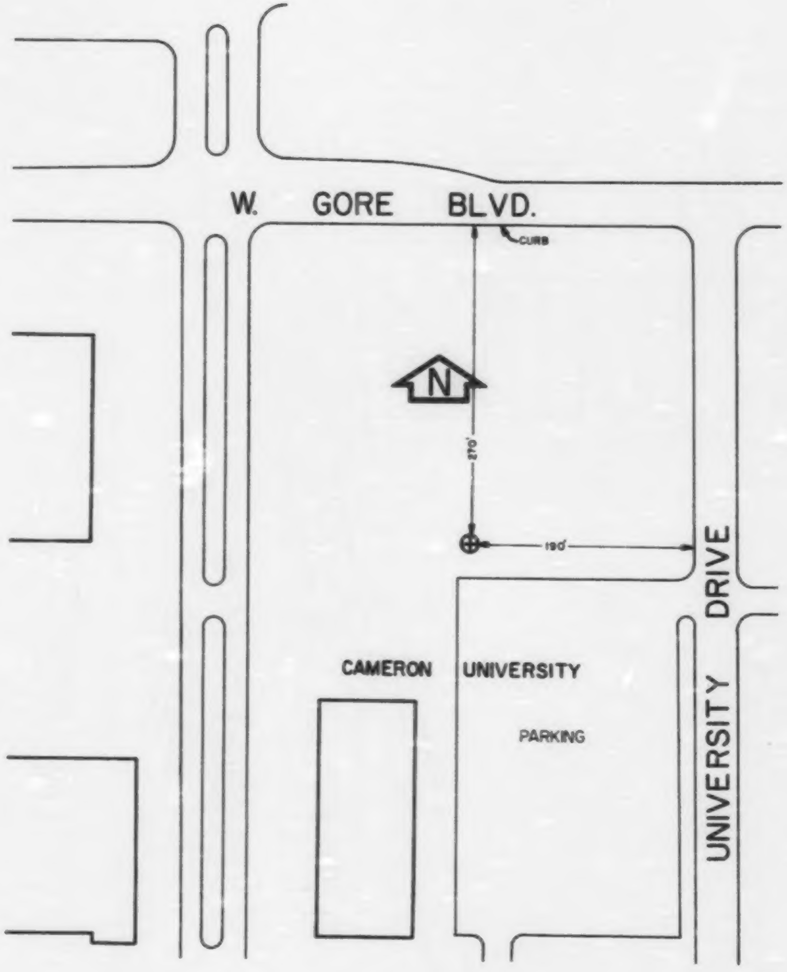

AVE.
AVE.
AVE.
N.W.
N.W. ARLINGTON
N.W. 36TH
NURSING HOME
COUNTY HOSPITAL
N.W. 29TH.
①
②
③
WEST GORE BLVD.
STATION
CAMERON STATE COLLEGE
S.W. CORNEL
S.W. A
S.W. B
S.W. C
S.W. D
S.W. E
ST.
UNIVERSITY DRIVE
S.W.
S.W. TULANE
AVE.
PL.
EVANS
S.W. 26TH.
S.W. F AVE.
38TH ST.
N.W.
S.W. CRESTVIEW DR.
ST.
S.W. G
SCALE
FEET
0
500

VICINITY MAP

LAND USE

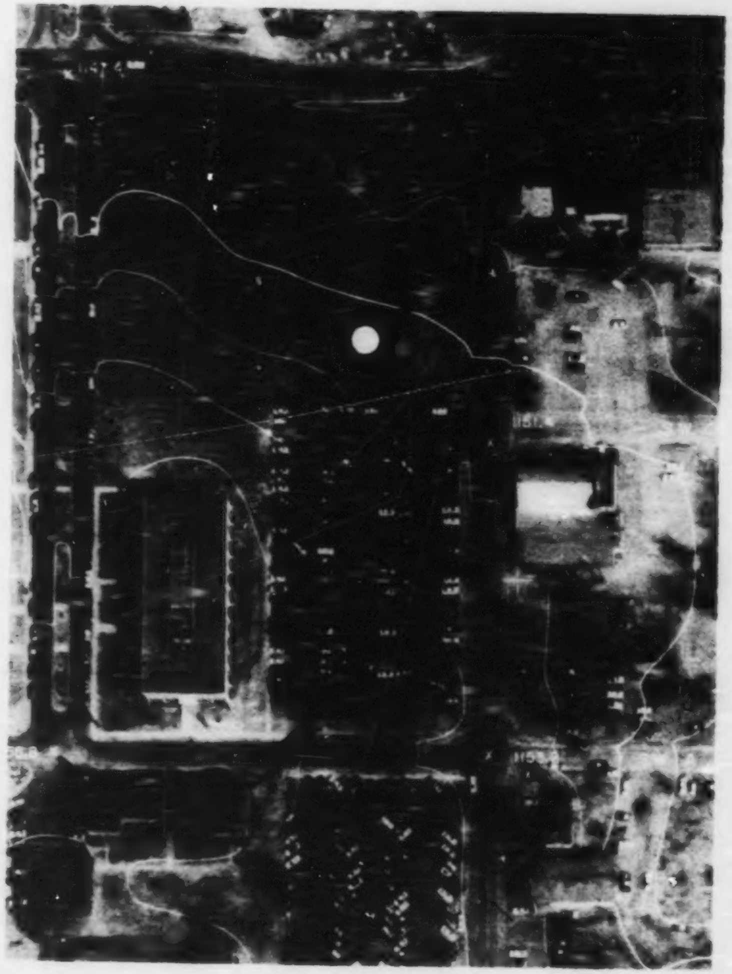
▨ LOW DENSITY RESIDENTIAL	▭ COMMERICAL	▭ VACANT
▨ HIGH DENSITY RESIDENTIAL	▒ PUBLIC FACILITY	▩ INDUSTRIAL

UN SITE # 6


W. GORE BLVD.
CURB
N
270'
190'
CAMERON UNIVERSITY
PARKING
UNIVERSITY DRIVE

UN SITE # 6

SCALE
FEET
0
50
100
200



AERIAL PHOTO

N
SCALE
FEET
0
50
100
200

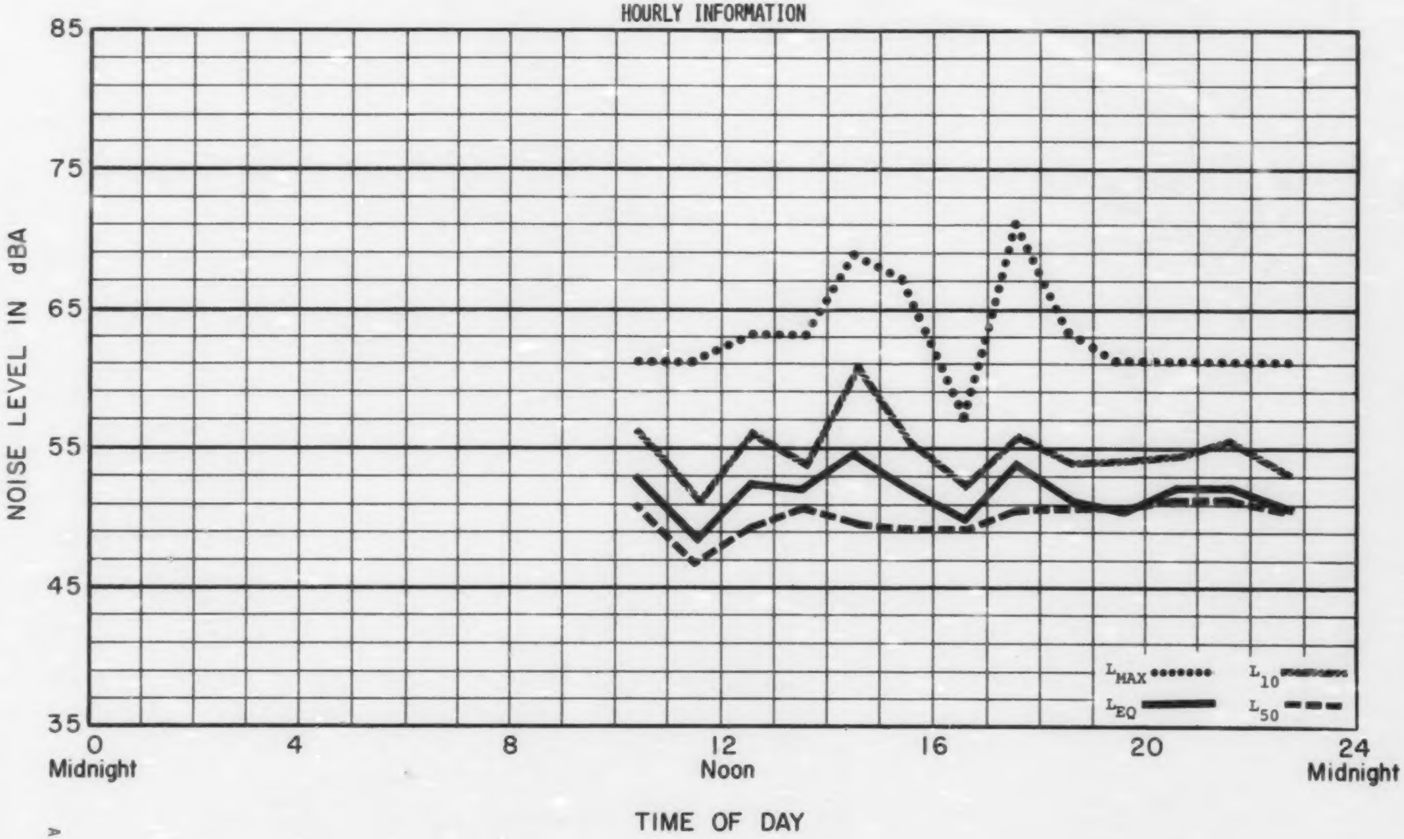
SITE # 6

SUMMARY OF NOISE LEVELS AT S-6 FOR JUNE 22, 1975

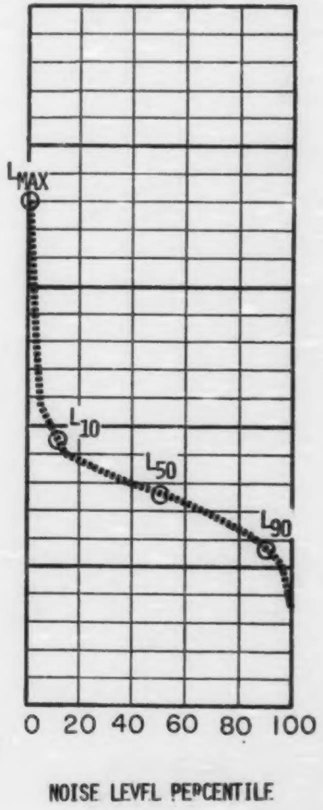
DAILY INFORMATION: L_{MAX} = 71 L_{10} = 55 L_{50} = 50

L_{90} = 46 L_{EQ} = 52 L_{DN} = 53

HOURLY INFORMATION



DAILY NOISE LEVEL DISTRIBUTION

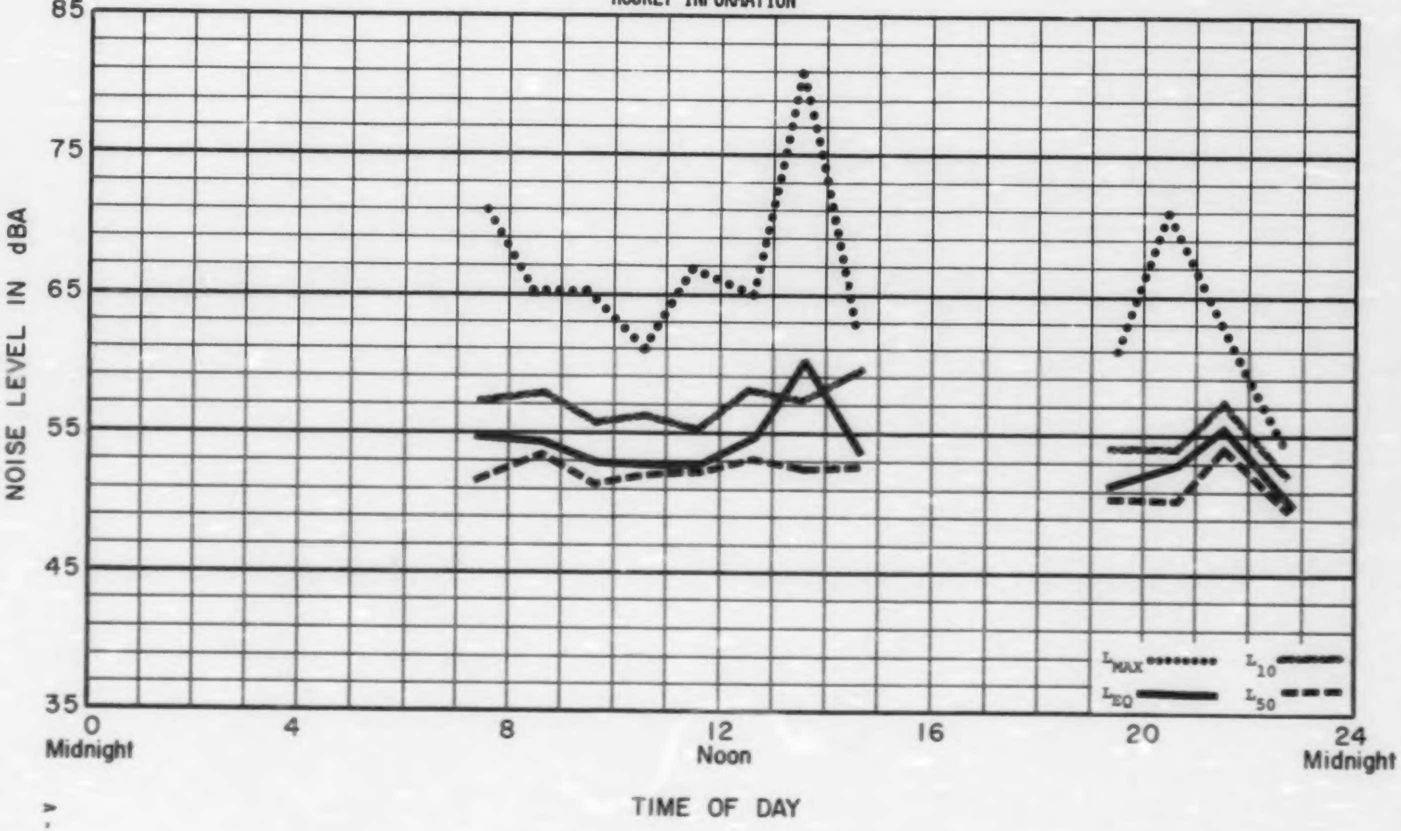


SUMMARY OF NOISE LEVELS AT S-6 FOR JUNE 23, 1975

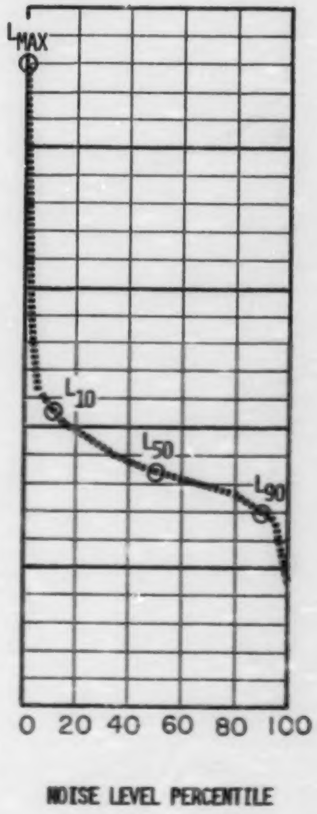
DAILY INFORMATION: L_{MAX} = 81 L_{10} = 56 L_{50} = 52

L_{90} = 49 L_{EQ} = 55 L_{DN} = 55

HOURLY INFORMATION



DAILY NOISE LEVEL DISTRIBUTION



NO. 7 FLOYD

I. Site Description

A. Population:
(Vicinity Map)

1972	1773
1975	1589
1995	1933

B. Land Use

This site is in the center of a well-developed neighborhood. It is 700 yards south of the nearest artillery firing point at Fort Sill.

C. Traffic

Traffic in the immediate vicinity of the site is entirely light residential, automobiles, delivery trucks and motorcycles.

Traffic Counts: (ADT)	Location	1975	1995
	1	1127	19,700
	2	NA	8,400

II. Operations

This site was scheduled for operations from 7:00 a.m. to 11:00 p.m. on Saturday, June 21 and Tuesday, June 24. It was rained out 2:00 to 3:00 p.m. and 7:00 to 11:00 p.m. on Tuesday. A one hour check run was made from 3:00 to 4:00 p.m. on Friday, July 18. There was no significant change from previous conditions except a lawnmower near the site gave an abnormally high number of readings in the fifties and low sixties.

III. Noise Sources

A. Typical Noise Sources

Primary:	Automobiles
Secondary:	Planes, trucks, motorcycles, yard maintenance, artillery.

B. Intrusive Noise sources

The most prevalent source of intrusive noise at this site was automobiles. Probably this can be attributed to the site being unavoidably closer to the street than is desirable. If measurements had been taken farther from the curb, probably only one or two automobiles would have been observed above 70 dBA, which would not indicate an unusually high incidence rate or intensity for this source. The average incidence rate for all sounds over 70 dBA at this site was one every seventy-five minutes. A more desirable microphone location would have resulted in an incidence rate about half of this, and would be more representative of noise experienced by residents in this area.

The sources noted during the 20 hours this site was operated are tabulated below.

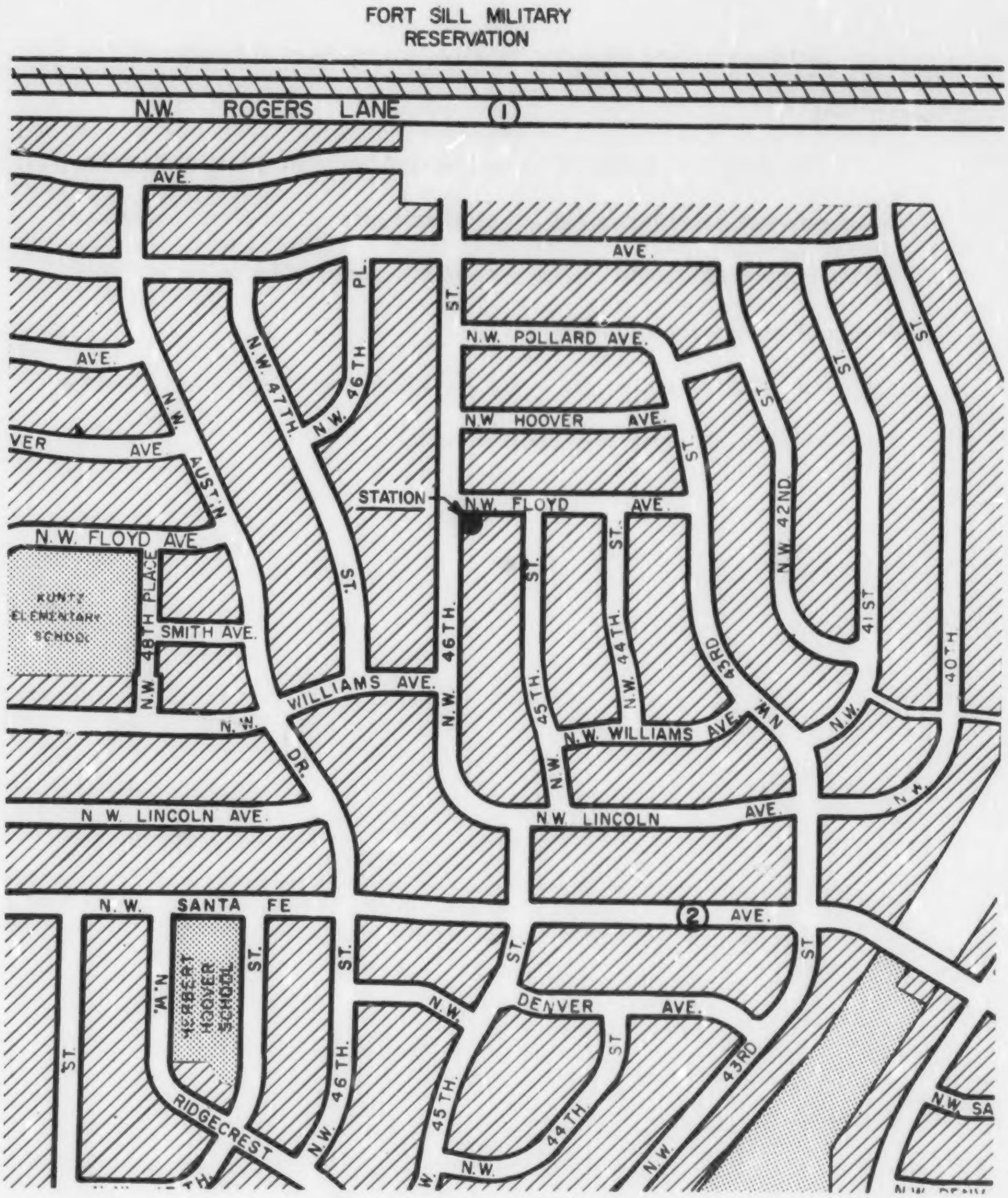
Sources	Number over 70 dBA
Small planes	2
Helicopters	4
Automobiles	6
Motorcycles	3
Trucks	1
Total	16

Artillery noise was noted twenty-two times at this site.

IV. Observations

The daily L_{eq} levels of 53 and 54 dBA indicate little probability of an adverse noise impact existing at this site. Less than ten percent of the population would probably be highly annoyed by noise at these levels of environmental noise.

The projected changes in traffic volume and population should have little effect upon these noise levels.


FORT SILL MILITARY RESERVATION
N.W. ROGERS LANE
①
AVE.
AVE.
AVE.
VER AVE.
N.W. AUSTIN
N.W. 47TH
N.W. 46TH PL.
ST.
N.W. POLLARD AVE.
N.W. HOOVER AVE.
STATION
N.W. FLOYD AVE.
N.W. FLOYD AVE
KUNTZ ELEMENTARY SCHOOL
N.W. 48TH PLACE
SMITH AVE.
ST.
N.W. 46TH.
N.W. 45TH. ST.
N.W. 44TH. ST.
43RD N.W.
N.W. 42ND. ST.
N.W. 41 ST.
40TH ST.
N.W. WILLIAMS AVE.
N.W. WILLIAMS AVE.
N.W. DR.
N.W.
N.W. LINCOLN AVE.
N.W. LINCOLN AVE.
N.W. SANTA FE
② AVE.
N.W. HERBERT HOOVER SCHOOL ST.
ST.
ST.
ST
ST.
N.W. DENVER AVE.
N.W. 46TH.
45TH.
N.W. 44TH. ST.
N.W. 43RD
RIDGECREST
N.W.
N.W. SA
N.W. DENV

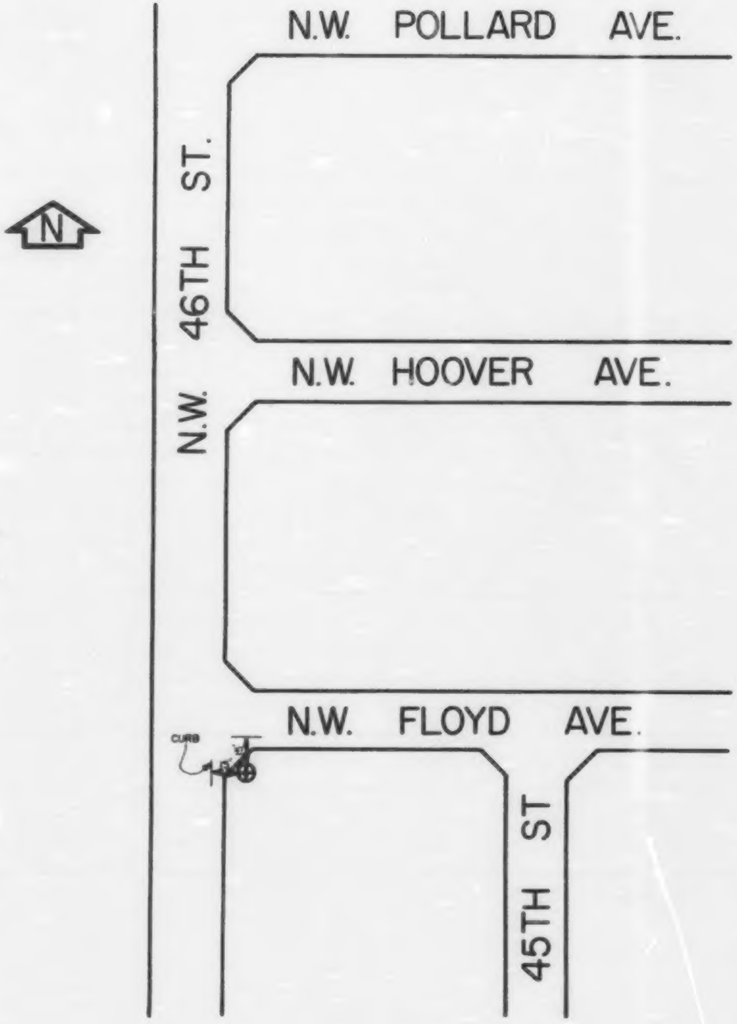
N
SCALE FEET
0 500

VICINITY MAP

LAND USE

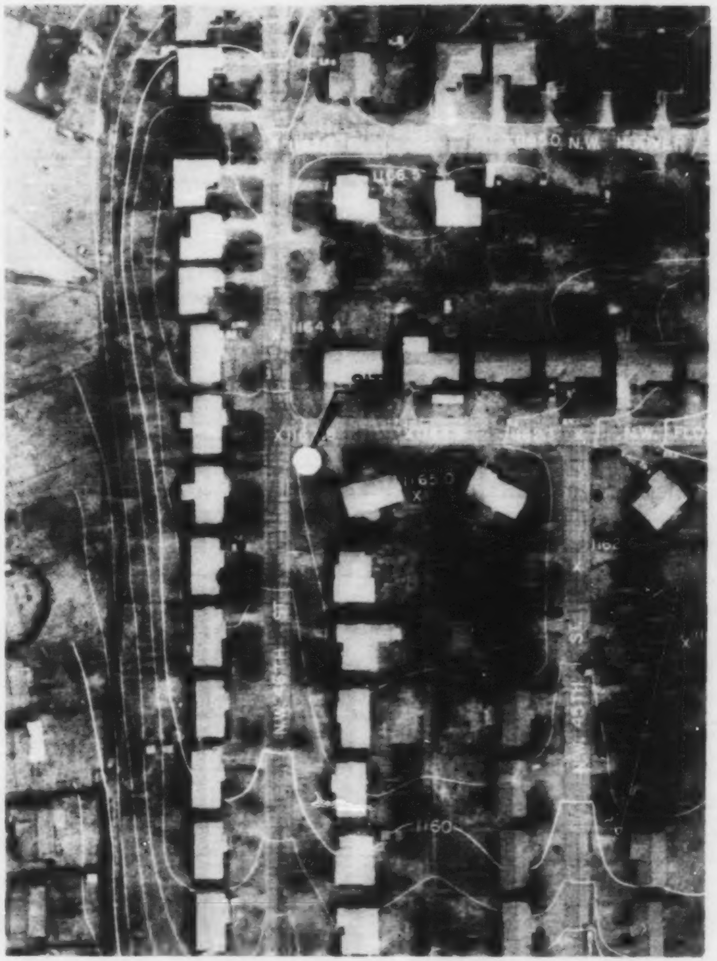
▨ LOW DENSITY RESIDENTIAL
▨ HIGH DENSITY RESIDENTIAL
▨ COMMERICAL
▨ PUBLIC FACILITY
☐ VACANT
▨ INDUSTRIAL

FL SITE # 7


N
N.W. POLLARD AVE.
N.W. HOOVER AVE.
N.W. FLOYD AVE.
N.W. 46TH ST.
45TH ST
CURB

FL SITE # 7

SCALE 0 50 100 200 FEET


N.W. HOOVER
N.W. FLOYD
N.W. 46TH ST
45TH ST
1160

AERIAL PHOTO

SCALE 0 50 100 200 FEET

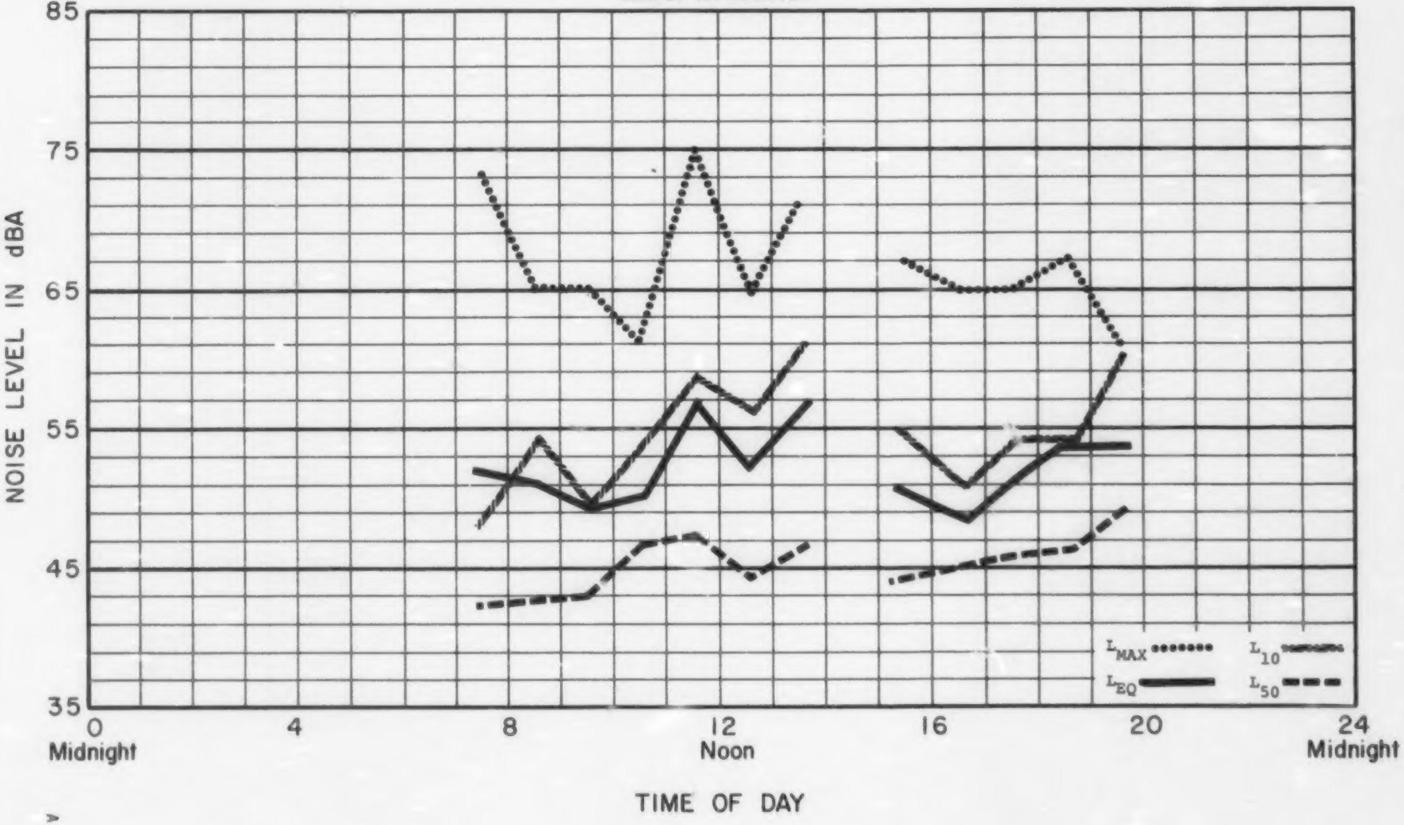
SITE # 7

SUMMARY OF NOISE LEVELS AT S-7 FOR JUNE 21, 1975

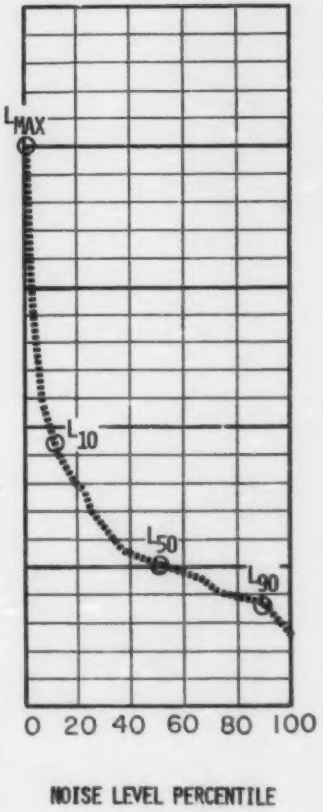
DAILY INFORMATION: L_{MAX} = 75 L_{10} = 54 L_{50} = 45

L_{90} = 42 L_{EQ} = 53 L_{DN} = 53

HOURLY INFORMATION



DAILY NOISE LEVEL DISTRIBUTION

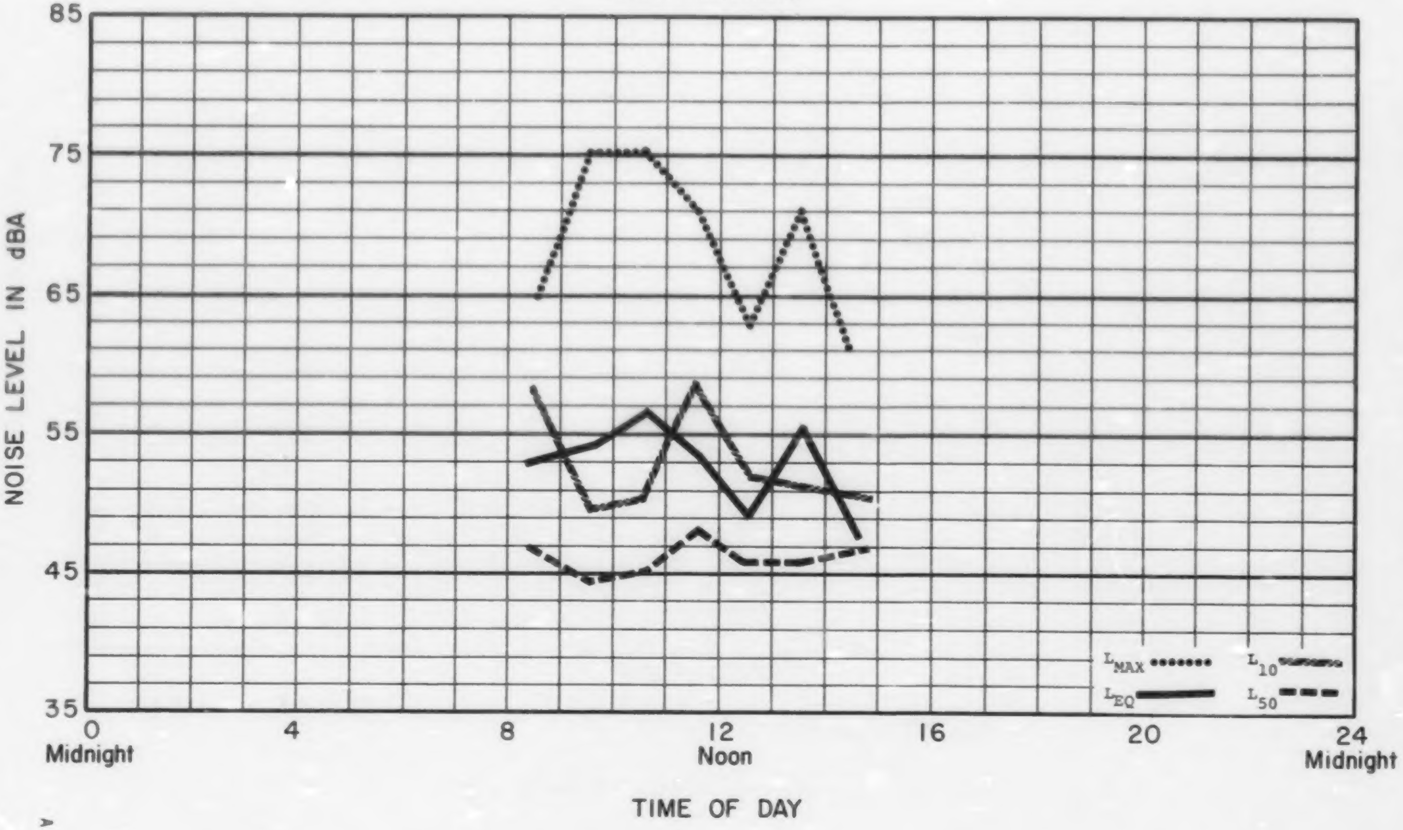


SUMMARY OF NOISE LEVELS AT S-7 FOR JUNE 24, 1975

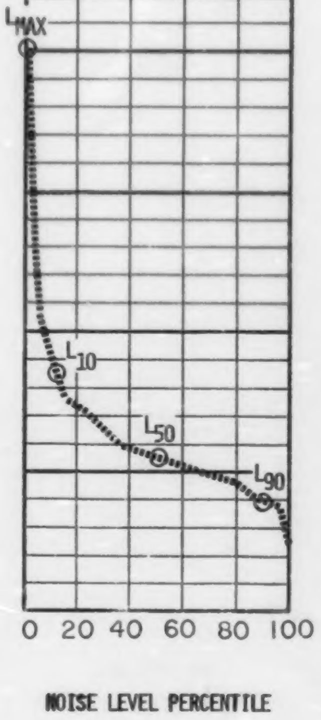
DAILY INFORMATION: L_{MAX} = 75 L_{10} = 53 L_{50} = 46

L_{90} = 43 L_{EQ} = 54 L_{DN} = 54

HOURLY INFORMATION



DAILY NOISE LEVEL DISTRIBUTION

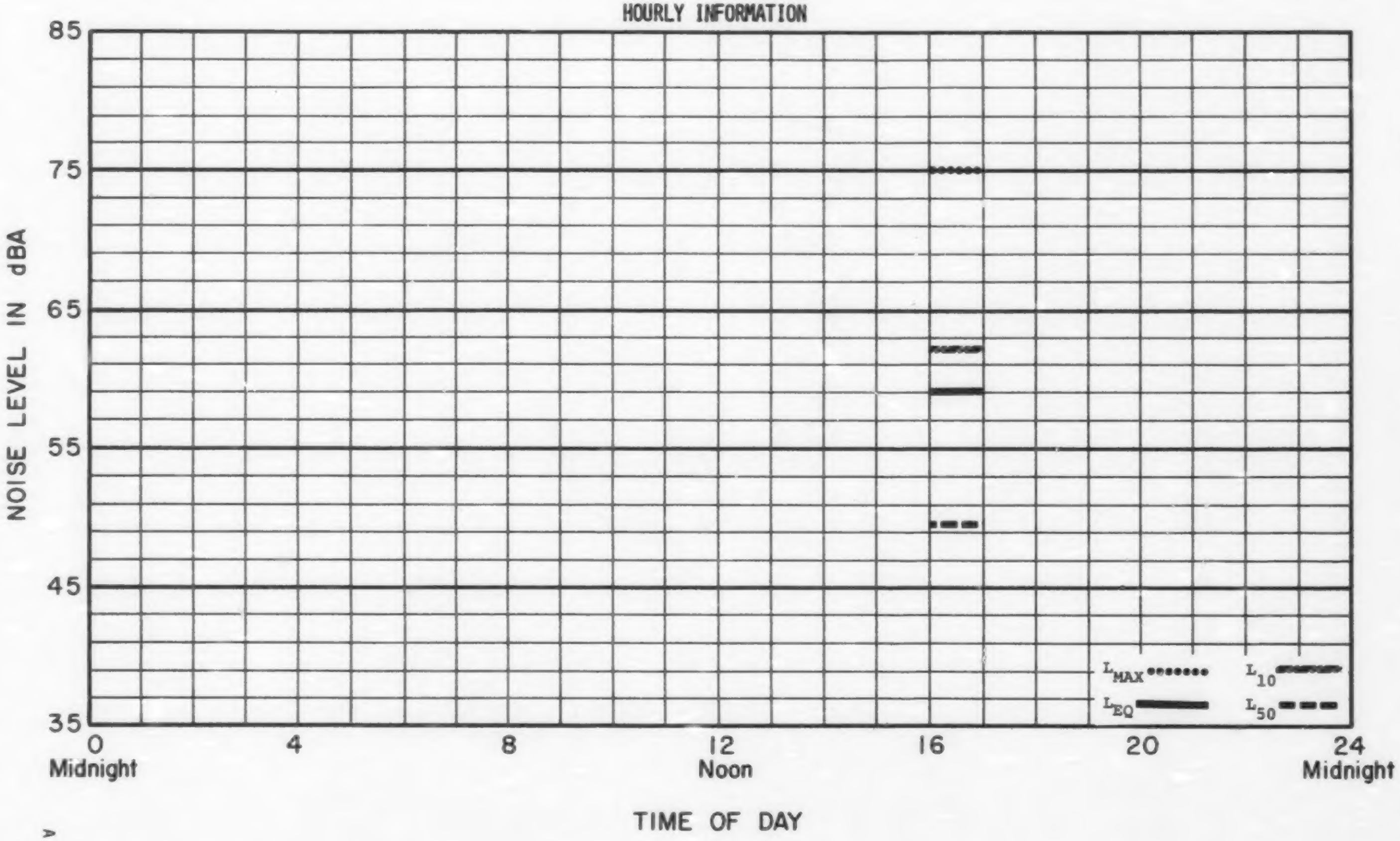


SUMMARY OF NOISE LEVELS AT S-7 FOR JULY 18, 1975

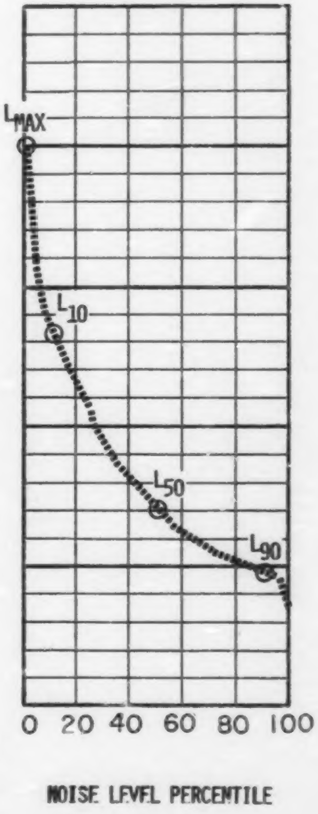
DAILY INFORMATION: L_{MAX} = 75 L_{10} = 62 L_{50} = 49

L_{90} = 45 L_{EQ} = 59 L_{DN} = 59

HOURLY INFORMATION



DAILY NOISE LEVEL DISTRIBUTION



NO. 8 EISENHOWER

I. Site Description

A. Population: (Vicinity Map)

1972 - 1442
1975 - 1080
1995 - 1474

B. Land Use

This site is located on a public school campus which extends to the south and west. Beyond Gore Boulevard 200 feet to the north the land use is residential. To the east of 52nd Street, a minor arterial, the land use is also residential. There is a limited amount of commercial near the intersection of 52nd and Gore.

C. Traffic

No buses, few heavy trucks, mostly automobiles and delivery trucks.

Traffic Counts:	Location	1975	1995
(ADT)	1	6285	14,000
	2	7171	2,000
	3	7457	13,700
	4	4495	2,500

II. Operations

This post was operated from 1:00 a.m. to 3:00 a.m. and from 4:00 a.m. to 7:00 p.m. on Saturday, June 21 (rained out 7:00 p.m. to 12:00 midnight Saturday), and from 1:00 a.m. to 12:00 p.m. on Tuesday, June 24.

II. Noise Sources

A. Typical Noise Sources

Primary:	Automobiles
Secondary:	Trucks, motorcycles, plane, air conditioning

B. Intrusive Noise Sources

Jet airplanes were the most prevalent source of intrusive noise at this site. However, there is no indication of an unusually high incidence rate or intensity for this source. The average incidence rate for all sources above 70 dBA at this site was about one every three hours.

The sources noted during the 38 hours this site was operated are tabulated below:

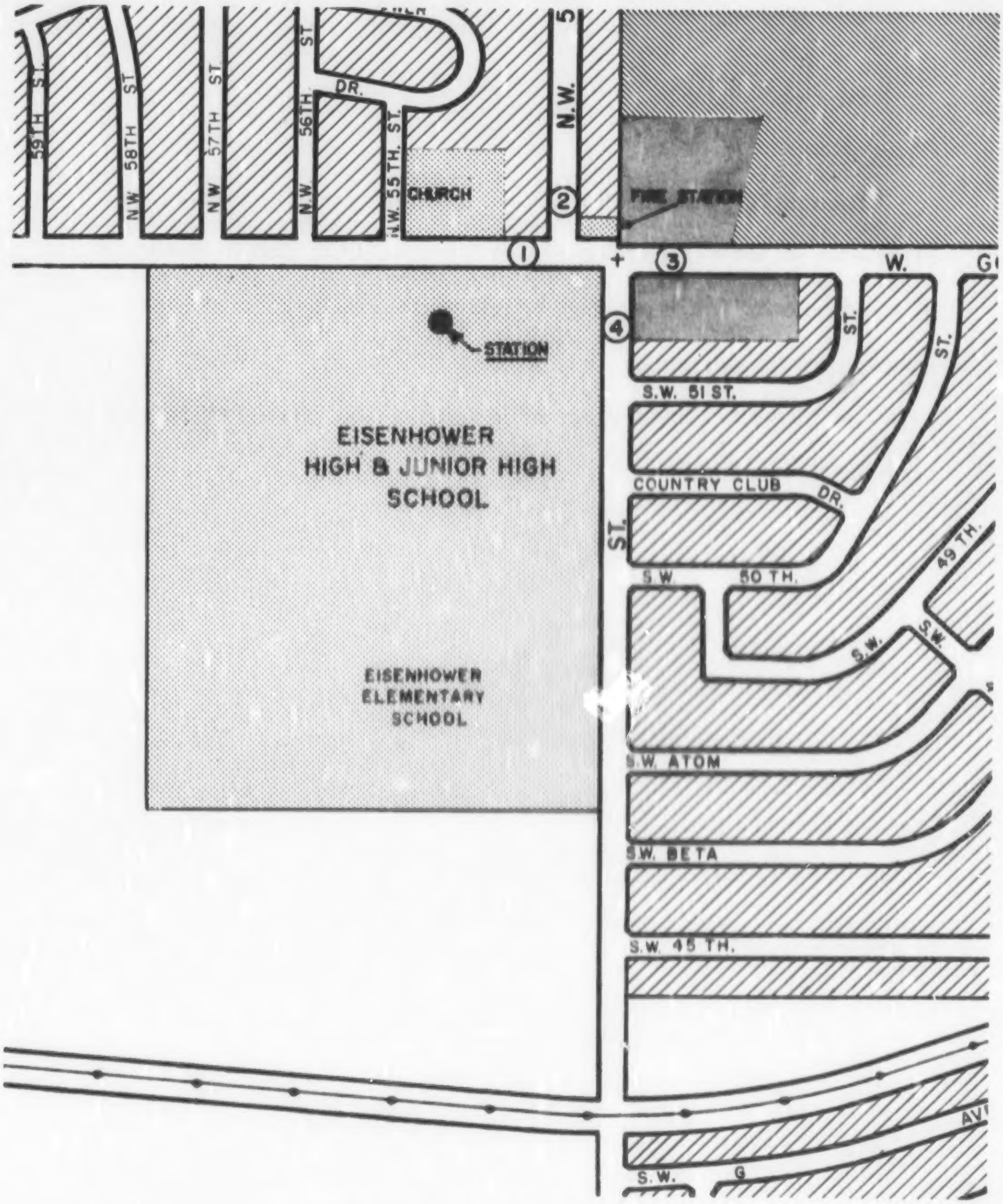
Source	Number over 70 dBA
Jets	5
Small planes	2
Automobiles	1
Motorcycles	3
Trucks	1
Loudspeaker	1
Total	13

No sound sources exceeded 80 dBA.

IV. Observations

The daily L_{eq} levels of 48 and 54 dBA indicate little probability of an adverse noise impact existing at this site. Less than five percent of the population would probably be highly annoyed by noise at these environmental noise levels.

The projected changes in traffic volume should have little effect upon these noise levels.

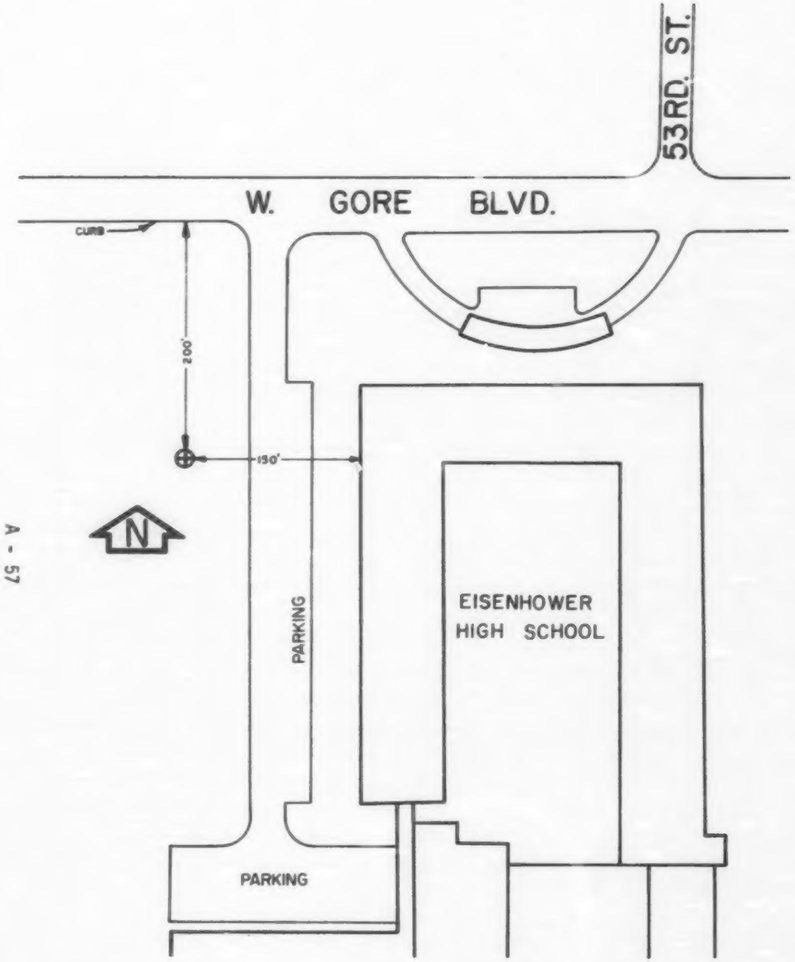

59TH ST.
N.W. 58TH ST.
N.W. 57TH ST.
N.W. 56TH ST.
DR.
N.W. 55TH. ST.
CHURCH
N.W. 5
FIRE STATION
①
②
③
④
W. G
STATION
ST.
S.W. 51 ST.
COUNTRY CLUB DR.
EISENHOWER
HIGH & JUNIOR HIGH
SCHOOL
EISENHOWER
ELEMENTARY
SCHOOL
ST.
S.W. 50 TH.
49 TH.
S.W.
S.W.
S.W. ATOM
S.W. BETA
S.W. 45 TH.
AV
S.W. G
N
SCALE FEET
0 600

VICINITY MAP

LAND USE

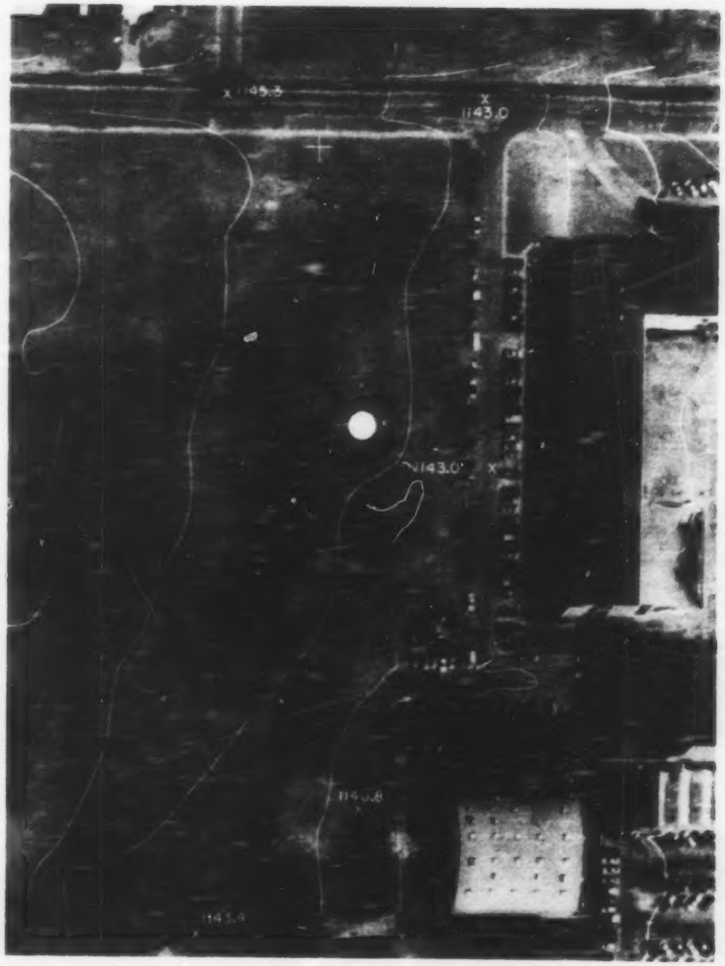
▨ LOW DENSITY RESIDENTIAL
▨ HIGH DENSITY RESIDENTIAL
▨ COMMERICAL
▨ PUBLIC FACILITY
☐ VACANT
▨ INDUSTRIAL

ES SITE # 8


53RD. ST.
W. GORE BLVD.
CURB
200'
150'
N
PARKING
EISENHOWER HIGH SCHOOL
PARKING

ES SITE # 8

SCALE
FEET
0
50
100
200


x 1145.8
x 1143.0
1143.0' x
1143.8
1143.4

AERIAL PHOTO

N
SCALE
FEET
0
50
100
200

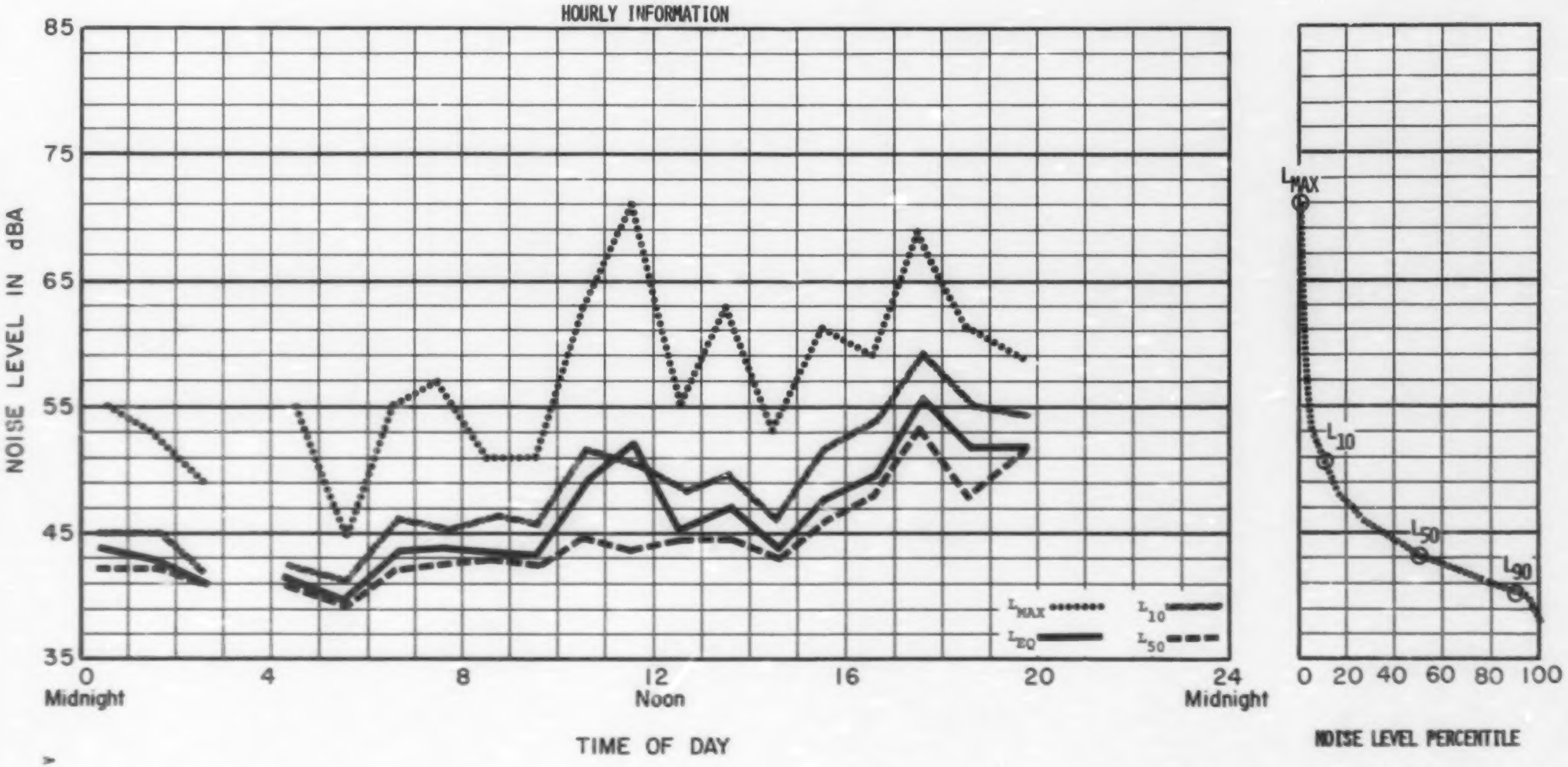
SITE # 8

SUMMARY OF NOISE LEVELS AT S-8 FOR JUNE 21, 1975

DAILY INFORMATION: L_{MAX} = 71 L_{10} = 51 L_{50} = 43

L_{90} = 40 L_{EQ} = 48 L_{DN} = 49

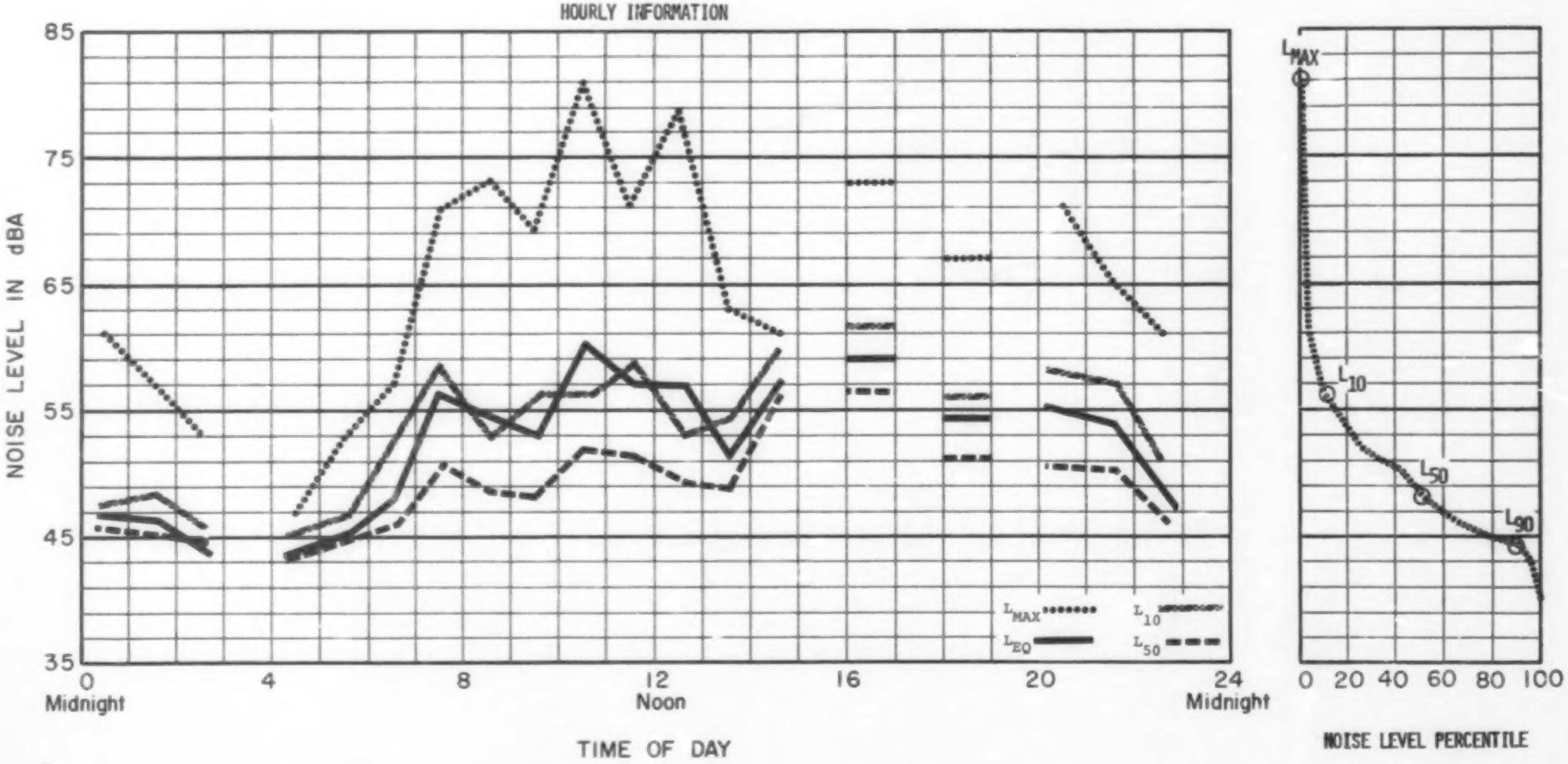
DAILY NOISE LEVEL DISTRIBUTION



SUMMARY OF NOISE LEVELS AT S-8 FOR JUNE 24, 1975

DAILY INFORMATION: L_{MAX} = 81 L_{10} = 56 L_{50} = 49

L_{90} = 44 L_{EQ} = 54 L_{DN} = 55



HOURLY INFORMATION

DAILY NOISE LEVEL DISTRIBUTION

NO. 9 HUNTER HILLS

I. Site Description

A. Population: (Vicinity Map)

1972 - 500
1975 - 475
1995 - 2100

B. Land Use

This site is in the center of a partially developed playground type park which in turn is within a well developed residential area. Beyond the residential area, land use is vacant to the north and west; partially developed strip commercial to the south; and residential to the east. This site is 2000 yards south of the nearest artillery firing point.

C. Traffic

Immediately adjacent to the site the traffic is automobiles, residential delivery and service trucks and motorcycles. Highway 62 and Cache Road to the north and south respectively are major arterials which carry all categories of heavy traffic.

Traffic Counts:	Location	1975	1995
(ADT)	1	1528	2,300
	2	3014	7,800
	3	3211	15,500

II. Operations

This post was scheduled to operate from 7:00 a.m. to 11:00 p.m. on Saturday, June 21 and Tuesday, June 24, 1975. It was rained out from 7:00 p.m. to 11:00 p.m. on Saturday and from 3:00 p.m. to 5:00 p.m. on Tuesday.

III. Noise Sources

A.	Primary:	Automobiles, motorcycles, dogs
	Secondary:	Artillery, yard maintenance, planes, helicopters

B. Intrusive Noise Sources

Helicopters were the most prevalent sources of intrusive noise at this site. While there was no indication of unusually intense sound levels, the incidence rate of helicopters noise over 70 dBA was unusually high relative to other areas in Lawton. The average incidence rate of all sounds over 70 dBA was about one every hour.

The sources noted during the 26 hours this site was operated are tabulated below.

Sources	Number over 70 dBA
Small planes	1
Helicopters	10
Automobiles	4
Motorcycles	5

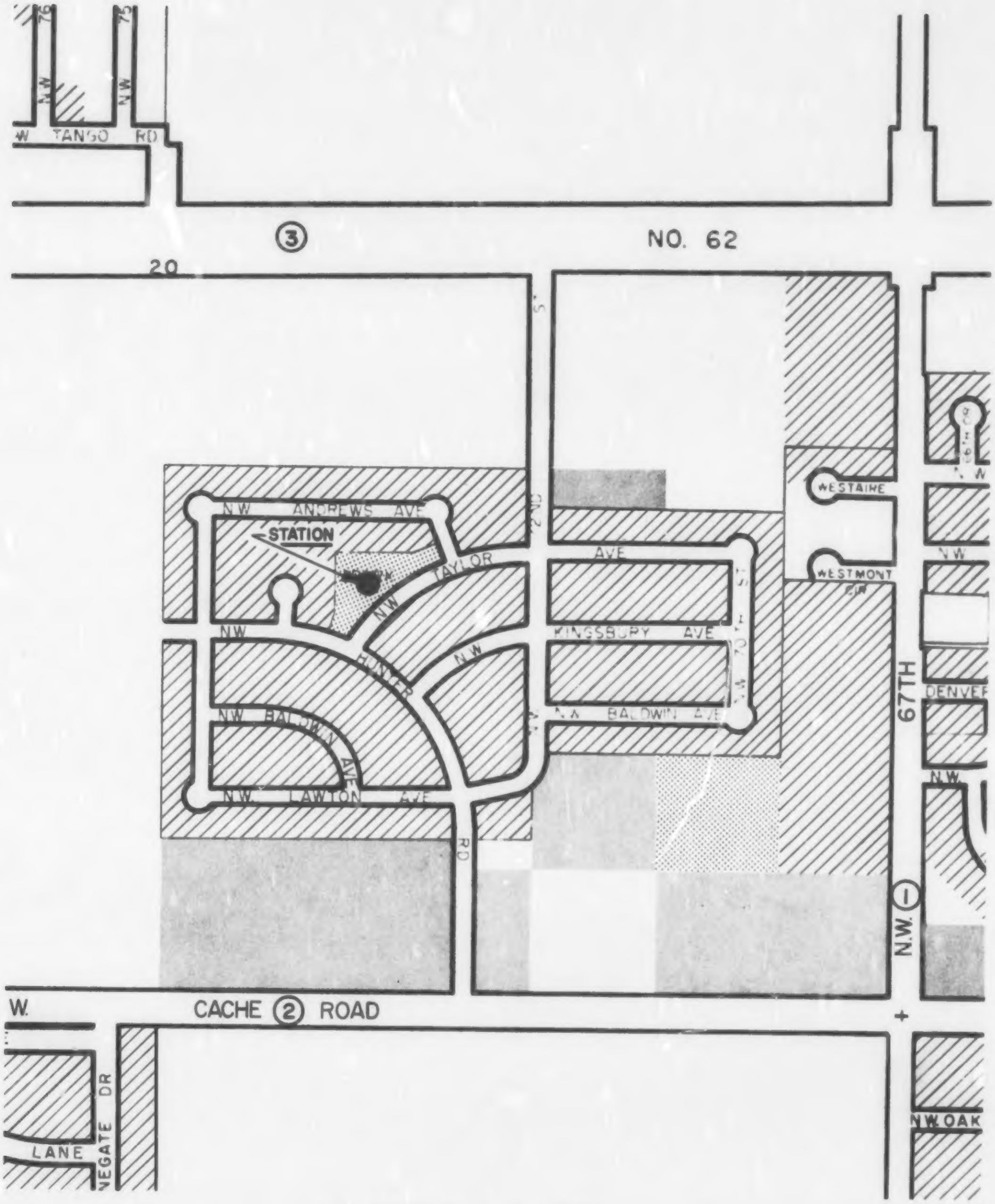
B. Intrusive Noise Sources (con't.)

Sources	Number over 70 dBA
Dogs	8
Total	28

Artillery noise was noted 38 times at this site.

IV. Observations

The daily L_{eq} levels of 55 and 50 dBA indicate little probability of an adverse noise impact presently existing at this site. About five percent of the population would probably be highly annoyed by noise at these levels. The projected changes in population and traffic near this site would produce higher levels and could result in an adverse impact in some areas. Careful planning should be exercised in the development of this region, especially in the vicinity of Highway No. 62.


N.W. 79
N.W. 75
W TANGO RD
③
NO. 62
20
N.W. ANDREWS AVE
STATION
N.W. TAYLOR AVE
N.W. HUNTER RD
N.W. KINGSBURY AVE
N.W. BALDWIN AVE
N.W. BALDWIN AVE
N.W. LAWTON AVE
72ND ST.
N.W. 70TH ST.
WESTAIRE
WESTMONT CIR
67TH
N.W. ①
DENVER
N.W.
W.
CACHE ② ROAD
LANE
VEGATE DR
N.W. OAK

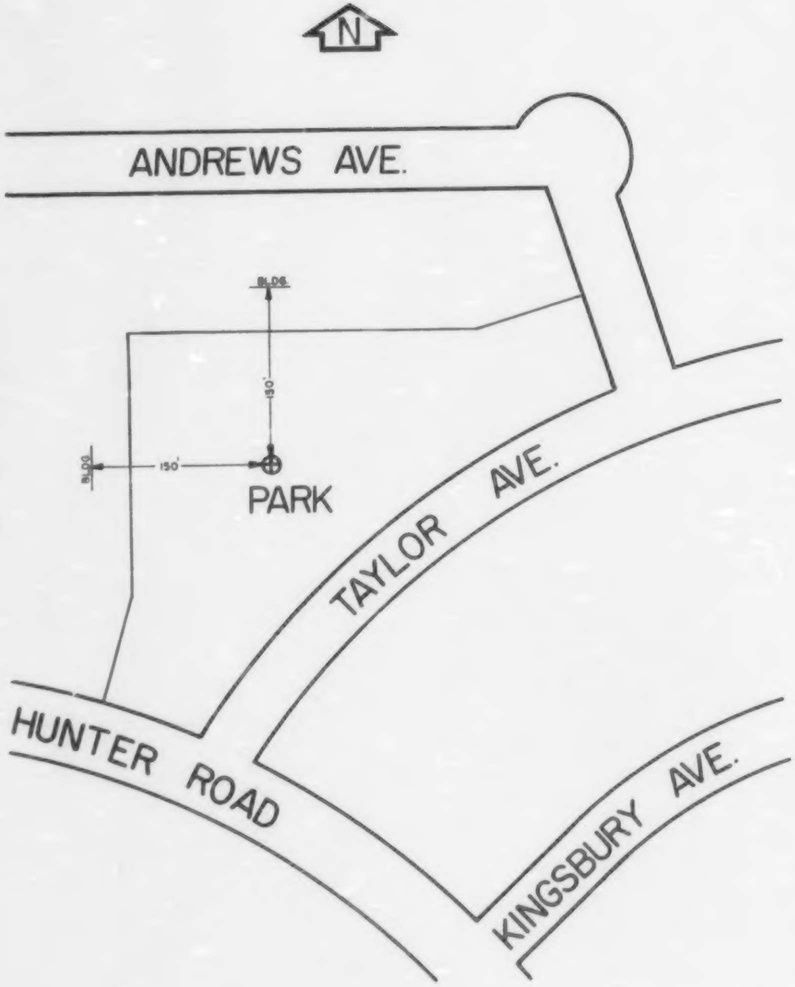
VICINITY MAP

LAND USE

N
SCALE FEET
0 600

▨ LOW DENSITY RESIDENTIAL
▩ HIGH DENSITY RESIDENTIAL
▭ COMMERICAL
░ PUBLIC FACILITY
☐ VACANT
▓ INDUSTRIAL

HH SITE # 9


N
ANDREWS AVE.
TAYLOR AVE.
HUNTER ROAD
KINGSBURY AVE.
PARK
BLDG
150'
BLDG
150'

HH SITE # 9

SCALE
FEET
0
50
100
200

1191.0
1189.0
1195.0
1193.2
1193.5

AERIAL PHOTO

N
SCALE
FEET
0
50
100
200

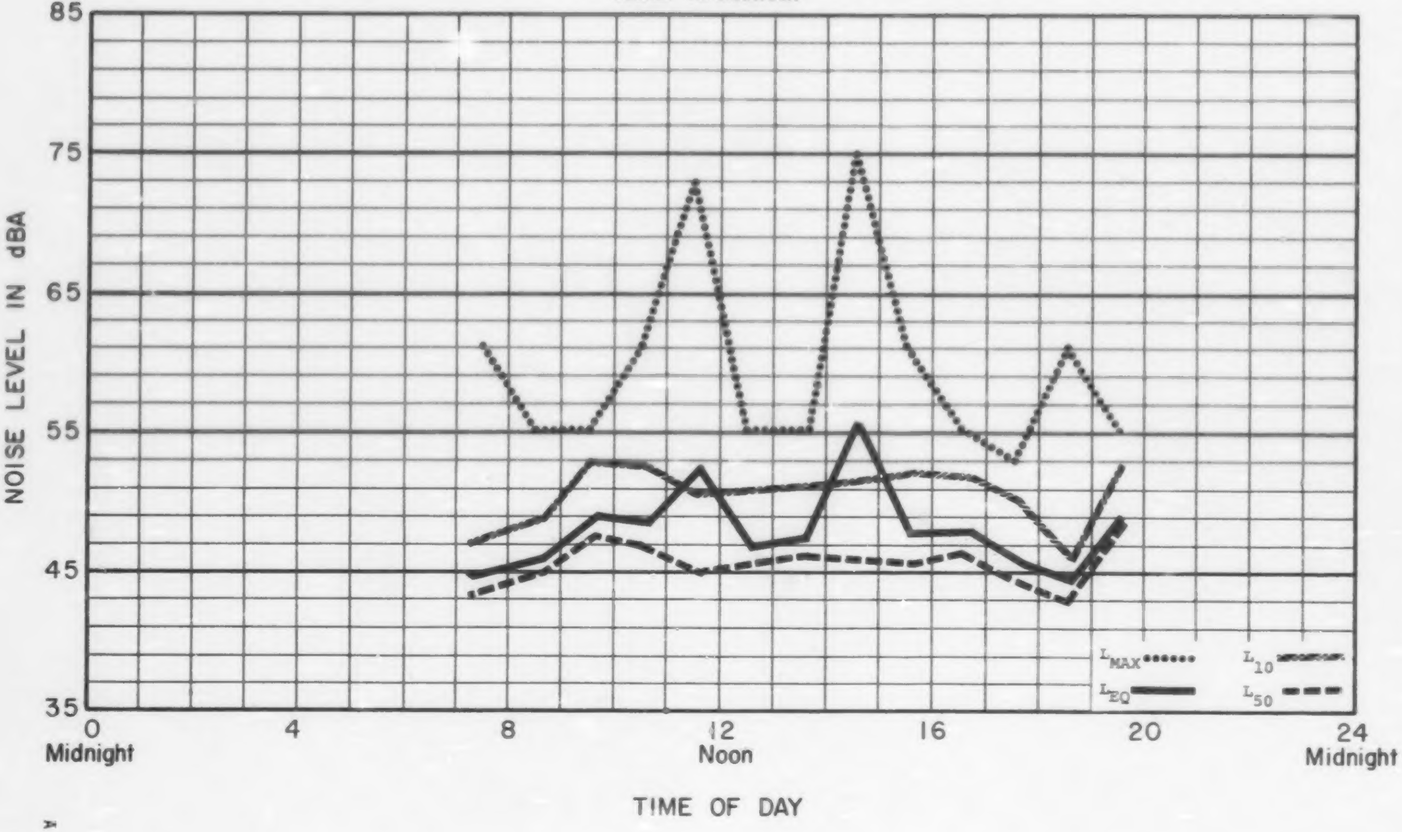
SITE # 9

SUMMARY OF NOISE LEVELS AT S-9 FOR JUNE 21, 1975

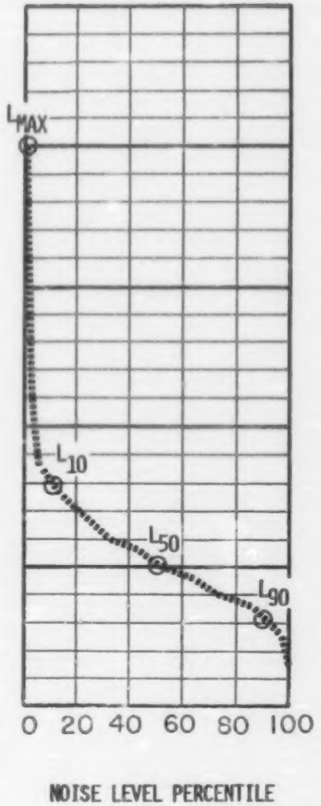
DAILY INFORMATION: L_{MAX} = 75 L_{10} = 51 L_{50} = 45

L_{90} = 41 L_{EQ} = 50 L_{DN} = 50

HOURLY INFORMATION



DAILY NOISE LEVEL DISTRIBUTION

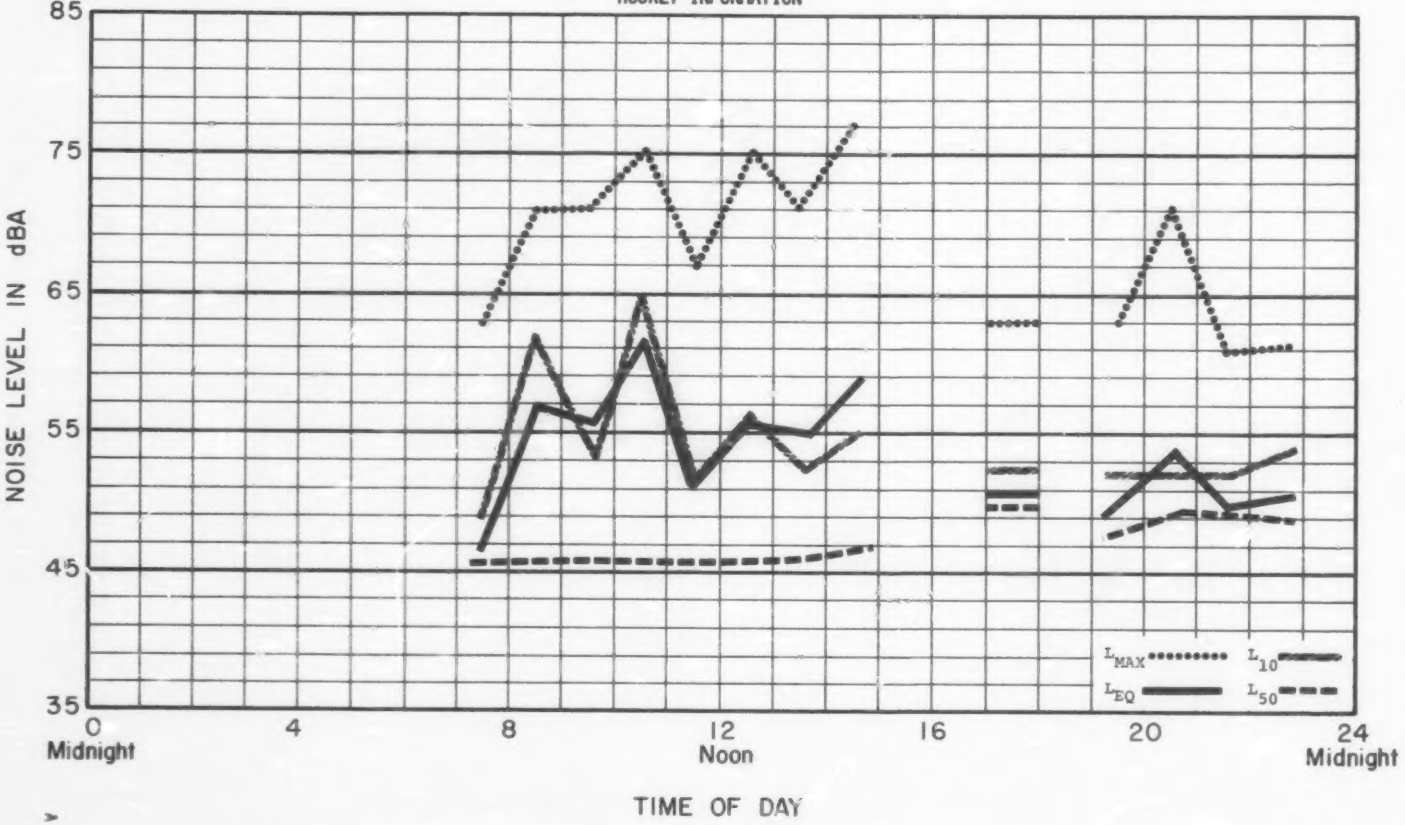


SUMMARY OF NOISE LEVELS AT S-9 FOR JUNE 24, 1975

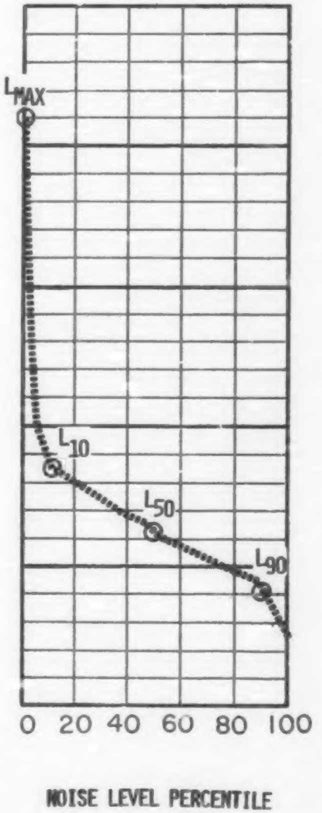
DAILY INFORMATION: L_{MAX} = 77 L_{10} = 53 L_{50} = 48

L_{90} = 44 L_{EQ} = 55 L_{DN} = 55

HOURLY INFORMATION



DAILY NOISE LEVEL DISTRIBUTION



No. 10 WOODLAND PARK

I. Site Description

A. Population:

(Vicinity Map)	1972 - 1793
	1975 - 1950
	1995 - 2200

B. Land Use

This site is in a park directly behind an elementary school and between two residential areas to the north and south. There is very little commercial use in the vicinity, some higher density residential and a considerable amount of vacant land beyond the immediate vicinity especially to the north and west.

C. Traffic

The nearest traffic some 200 feet distant is automobiles, motorcycles, and light commercial trucks. 67th street, 500 feet to the east is a busy street but carries relatively few heavy trucks. West Gore Boulevard to the south is less busy at this time but can be expected in the future to carry more traffic of all categories.

Traffic Counts:	Location	1975	1995
(ADT)	1	3666	1300
	2	352	9700

II. Operations

This post was scheduled to be operational 7:00 a.m. to 11:00 p.m. on Sunday, June 22 and Monday, June 23. It was rained out from 7:00 to 9:00 a.m. on Sunday and from 2:00 p.m. to 5:00 p.m. on Monday. It was also necessary to shut down because of a personnel shortage from 2:00 p.m. to 11:00 p.m. on Sunday. A check of one hour was done from 2:00 p.m. to 3:00 p.m. on Friday, July 18. Sound levels at that time were stable and uniform but somewhat higher than in the initial sample. This was attributable to cicadas (seventeen year locusts) in the trees and not to any other sources.

III. Noise sources

A. Typical Noise Sources

Primary:	Birds, automobiles
Secondary:	Yard maintenance, artillery, motorcycles, cicadas

B. Intrusive Noise Sources

There were no sources of intrusive noise which showed unusually high incidence rates at this site. However, unusually intense noise was observed once from railroad operations. The average incidence rate of all sources exceeding 70 dBA was about one every four hours.

The sources noted during the 19 hours this site was operated are tabulated below.

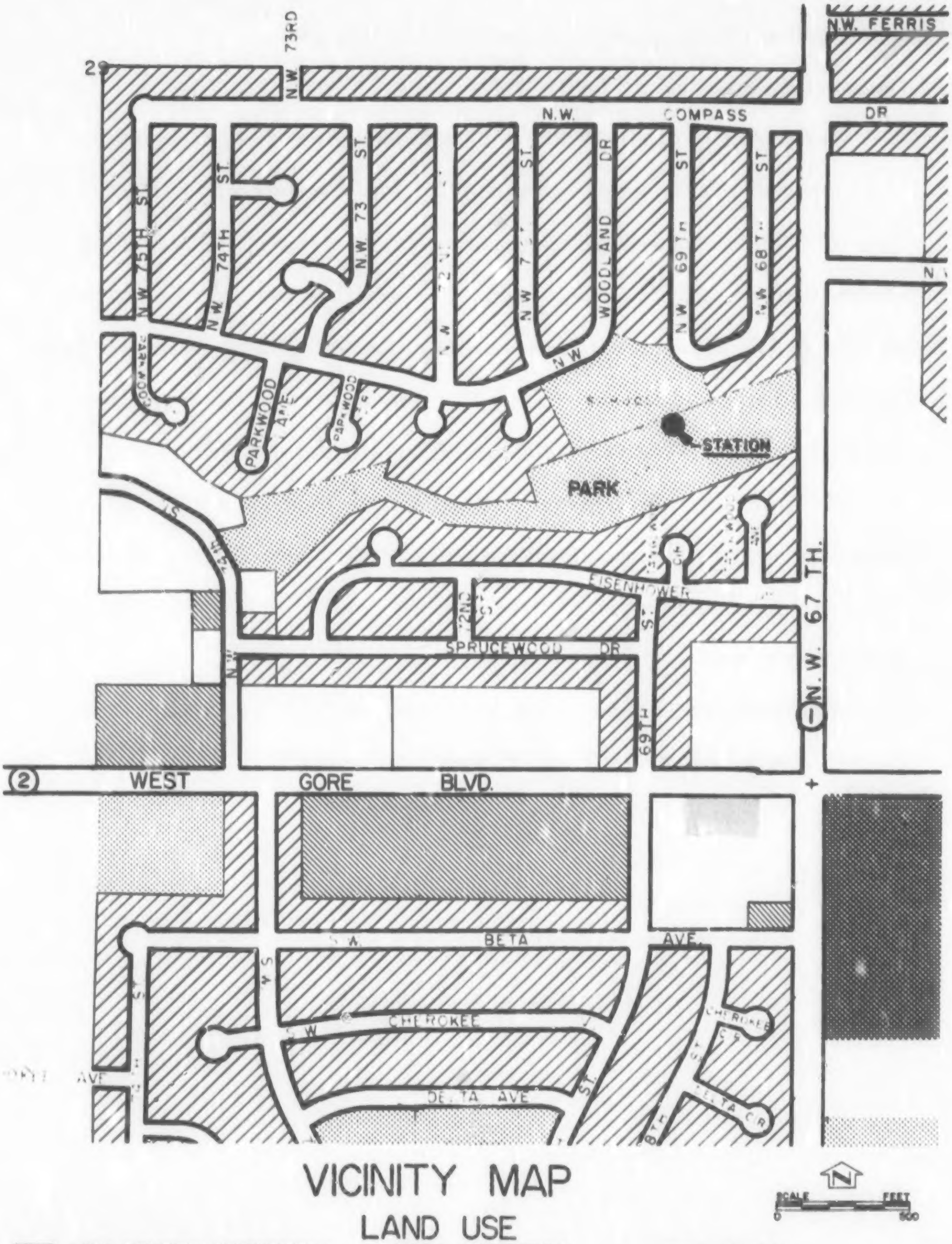
Source	Over 70 dBA	Over 80 dBA
Railroad	1	1
Motorcycles	1	1
Dogs	2	0
Total	4	2

Artillery noise was noted seven times at this site.

IV. Observations

The daily L_{eq} values of 60 and 53 dBA indicate a slight probability of an adverse noise impact existing at this site. The daily values for June 22 should not be construed as adequately representative of the prevailing environment at this site since it is based on only five hours of measurement and its value is dominated by two unusually high data points. More extensive measurements would be required to accurately determine representative levels at this site. However, this does not seem warranted in view of the low probability that such measurements would indicate an adverse noise impact since the mean of all hourly L_{eq} values was 55 dBA. At this level, about ten percent of the population would probably be highly annoyed by noise.

The projected changes in population and traffic volume at this site would probably have only a small effect on levels at this site.

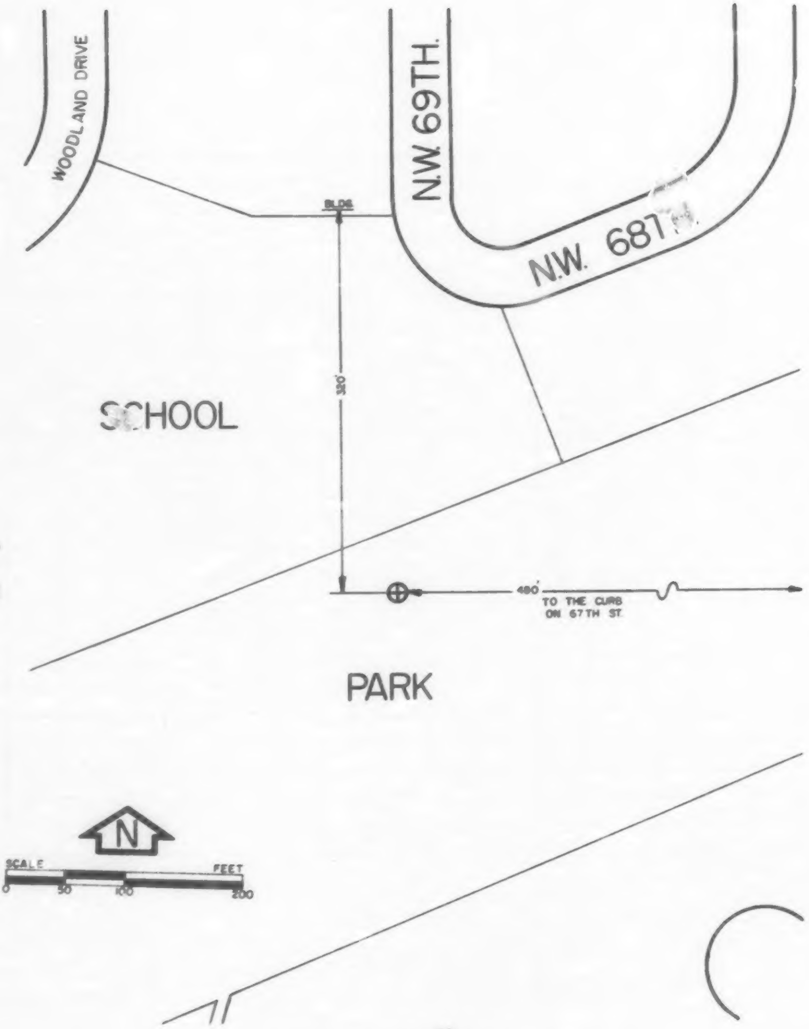

N.W. FERRIS
N.W. 73RD
N.W. COMPASS DR
N.W. 75TH ST
N.W. 74TH ST
N.W. 73 ST
N.W. WOODLAND DR
N.W. 69TH ST
N.W. 68TH ST
PARKWOOD LANE
STATION
PARK
EISENHOWER
SPRUCEWOOD DR
69TH
N.W. 67 TH.
①
②
WEST GORE BLVD.
S.W. BETA AVE.
S.W. CHEROKEE
CHEROKEE
DELTA AVE
DELTA CIR
SCALE
FEET
0
500
N

VICINITY MAP

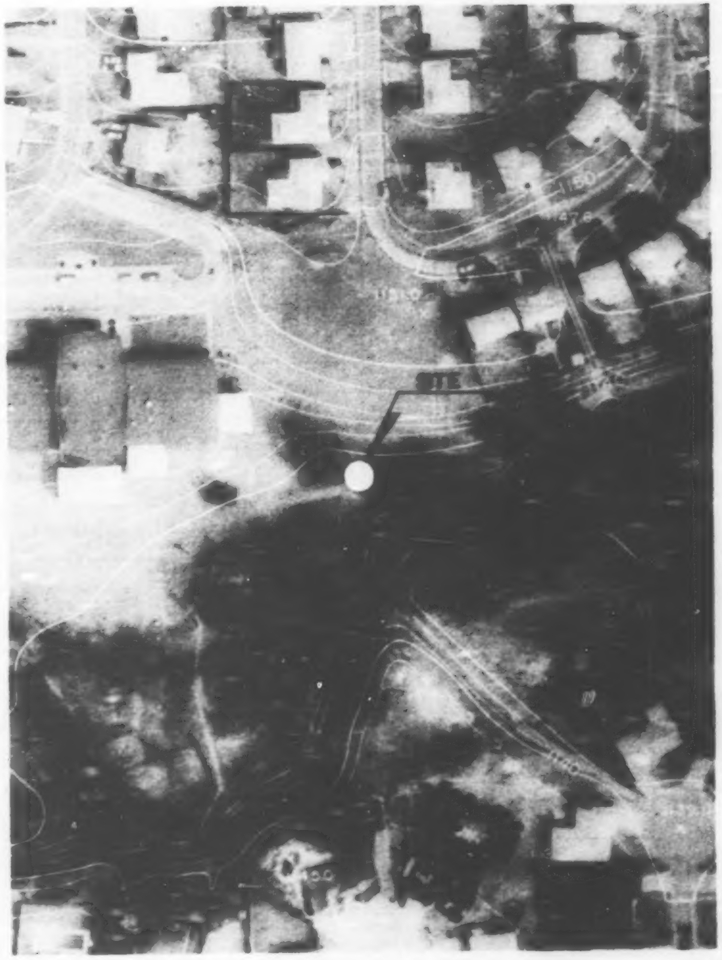
LAND USE

▨ LOW DENSITY RESIDENTIAL
▨ HIGH DENSITY RESIDENTIAL
▨ COMMERICAL
▨ PUBLIC FACILITY
☐ VACANT
■ INDUSTRIAL

WP SITE # 10


WOODLAND DRIVE
N.W. 69TH.
N.W. 68TH
BLDG
320'
SCHOOL
480'
TO THE CURB ON 67TH ST.
PARK
N
SCALE
FEET
0
50
100
200

WP SITE # 10


SITE

AERIAL PHOTO

N
SCALE
FEET
0
50
100
200

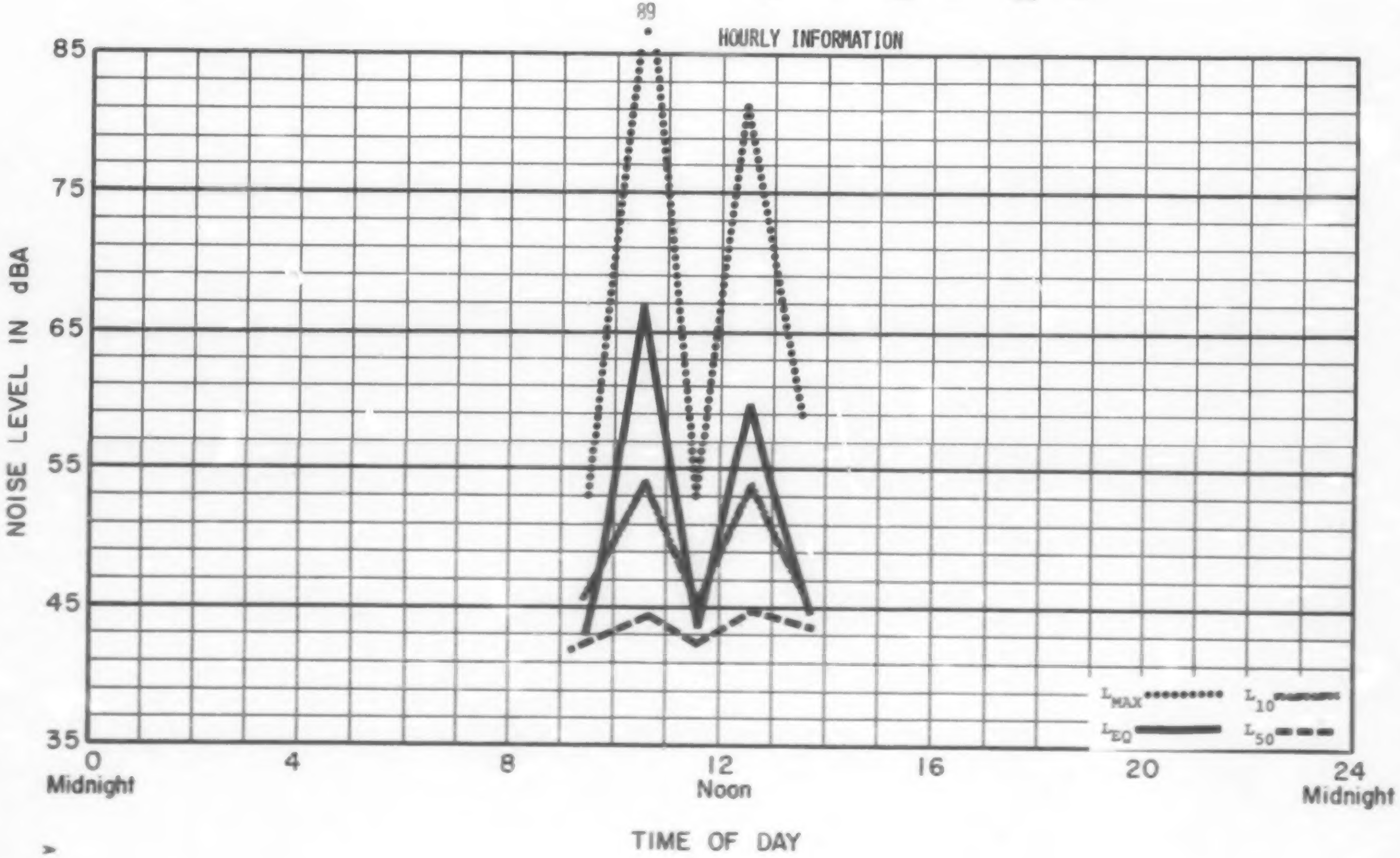
SITE # 10

SUMMARY OF NOISE LEVELS AT S-10 FOR JUNE 22, 1975

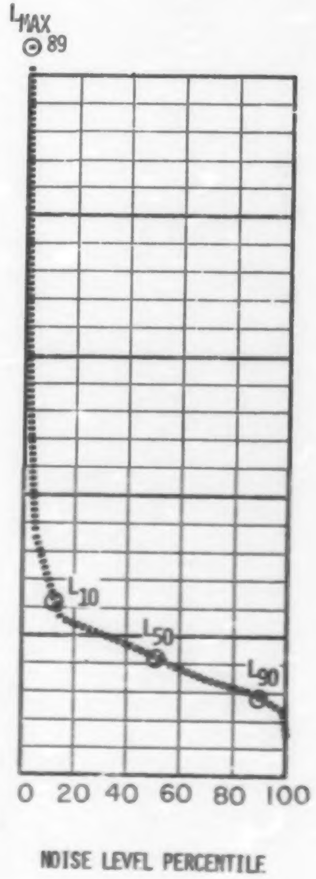
DAILY INFORMATION: L_{MAX} = 89 L_{10} = 50 L_{50} = 43

L_{90} = 41 L_{EQ} = 60 L_{DN} = 60

HOURLY INFORMATION



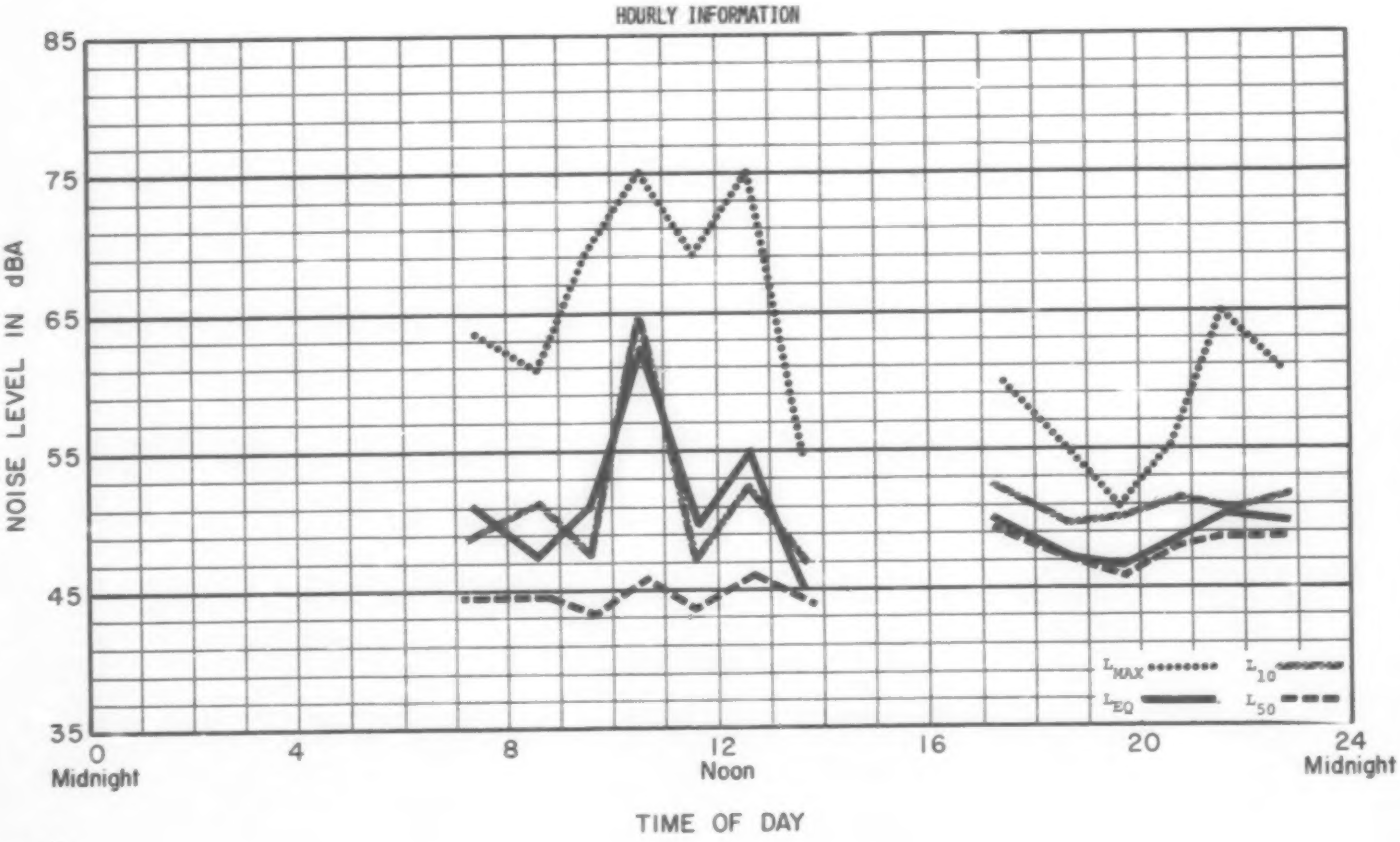
DAILY NOISE LEVEL DISTRIBUTION

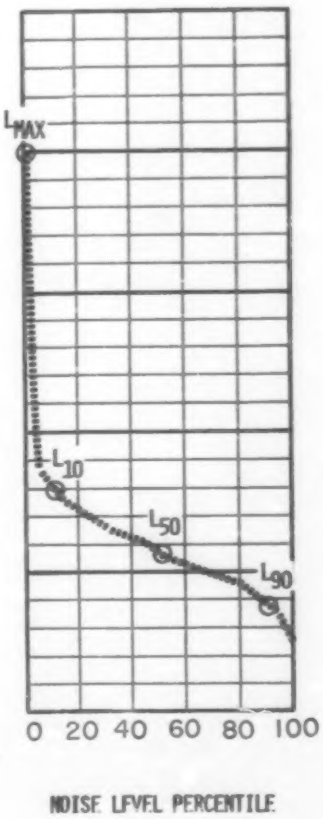


SUMMARY OF NOISE LEVELS AT S-10 FOR JUNE 23, 1975

DAILY INFORMATION: L_{MAX} = 75 L_{10} = 51 L_{50} = 46

L_{90} = 43 L_{EQ} = 53 L_{DN} = 54

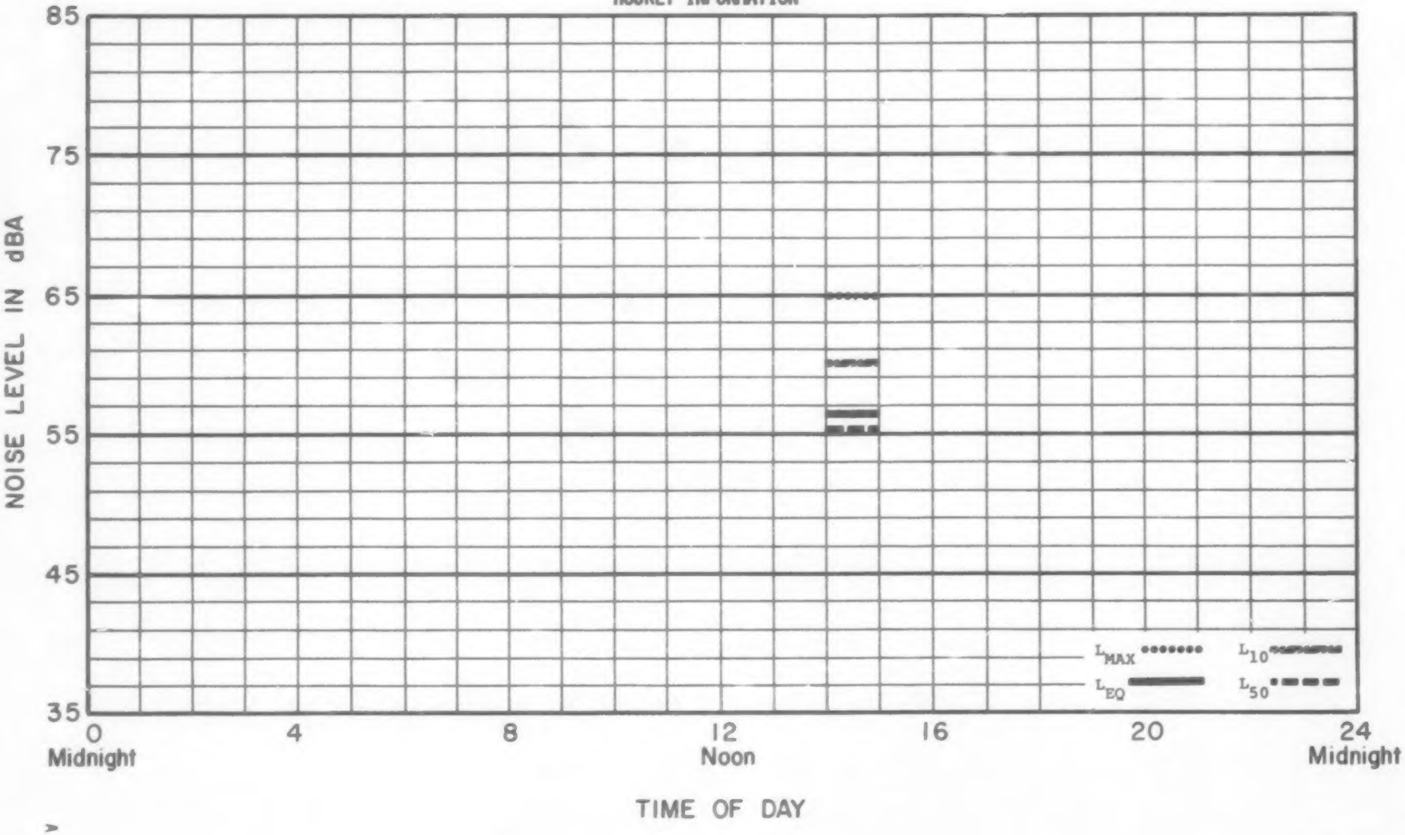

HOURLY INFORMATION


DAILY NOISE LEVEL DISTRIBUTION

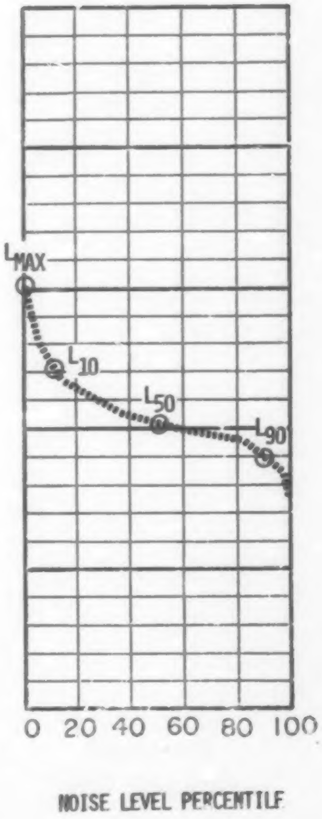
SUMMARY OF NOISE LEVELS AT S-10 FOR JULY 18, 1975

DAILY INFORMATION: L_{MAX} = 65 L_{10} = 60 L_{50} = 55
L_{90} = 53 L_{EQ} = 56 L_{DN} = 56

HOURLY INFORMATION



DAILY NOISE LEVEL DISTRIBUTION



NO. 11 CENTRAL BUSINESS DISTRICT

I. Site Description

A. Population: (Vicinity Map)

1972 - 734
1975 - 662
1995 - 430

B. Land Use

Much of this land is temporarily vacant as a result of current urban renewal operations. It is anticipated that it will be fully developed in the near future as a modernized central business district. There are active businesses to the east along C Avenue and some to the north between 2nd and 3rd Streets.

C. Traffic

2nd Street and Gore Boulevard are major arterials carrying heavy traffic of all kinds. Other streets in the area are business streets carrying local traffic mostly automobiles and delivery trucks.

Traffic Counts: (ADT)	Location	1975	1995
	1	3,159	3,100
	2	10,818	7,900
	3	1,169	3,100
	4	1,940	700
	5	8,848	15,500

II. Operations

This site was occupied from 6:00 a.m. to 10:00 p.m. Thursday, July 17, 1975 to provide a base level of sound with which a later assessment could be compared after redevelopment of the CBD is complete.

III. Noise sources

A. Typical Noise Sources

Primary:	Automobiles, trucks, jets
Secondary:	Cicadas

B. Intrusive Noise Sources

Jet aircraft and trucks were the most prevalent sources of intrusive environmental noise at this site. Jets showed unusually high intensities and both sources had unusually high incidence rates relative to other sites in Lawton. The average incidence rate for all sounds above 70 dBA at this site was slightly less than one every two hours.

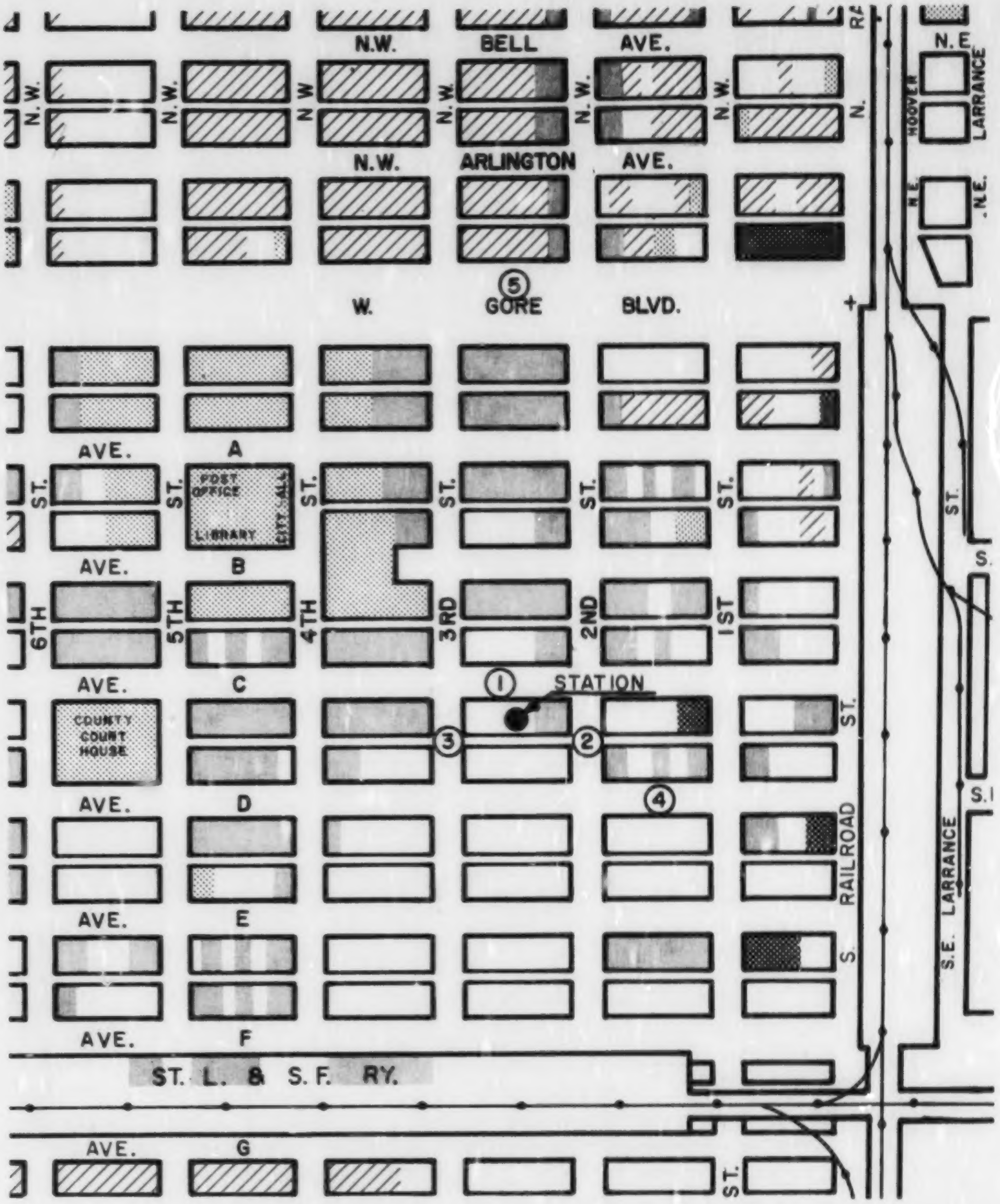
The sources noted during the 16 hours this site was operated are noted below.

Source	Over 70 dBA	Over 80 dBA
Jets	6	3
Trucks	4	0
Total	10	3

No other noise sources were noted.

IV. Observations

The daily L_{eq} of 57 dBA observed at this site indicates some probability of an adverse noise impact existing at this site. Even though this is not an intended residential district, this impact should be of concern to hotels, etc.. At this level of environmental noise, 15 percent of the population would be highly annoyed by noise.


N.W. BELL AVE.
N.W. ARLINGTON AVE.
W. GORE BLVD.
AVE. A
AVE. B
AVE. C
AVE. D
AVE. E
AVE. F
AVE. G
N.W. 6TH ST.
N.W. 5TH ST.
N.W. 4TH ST.
N.W. 3RD ST.
N.W. 2ND ST.
N.W. 1ST ST.
POST OFFICE
LIBRARY
CITY HALL
COUNTY COURT HOUSE
STATION
①
②
③
④
⑤
RAILROAD ST.
ST. L. & S.F. RY.
N.E. HOOVER
N.E. LARRANCE
S.E. LARRANCE ST.

VICINITY MAP

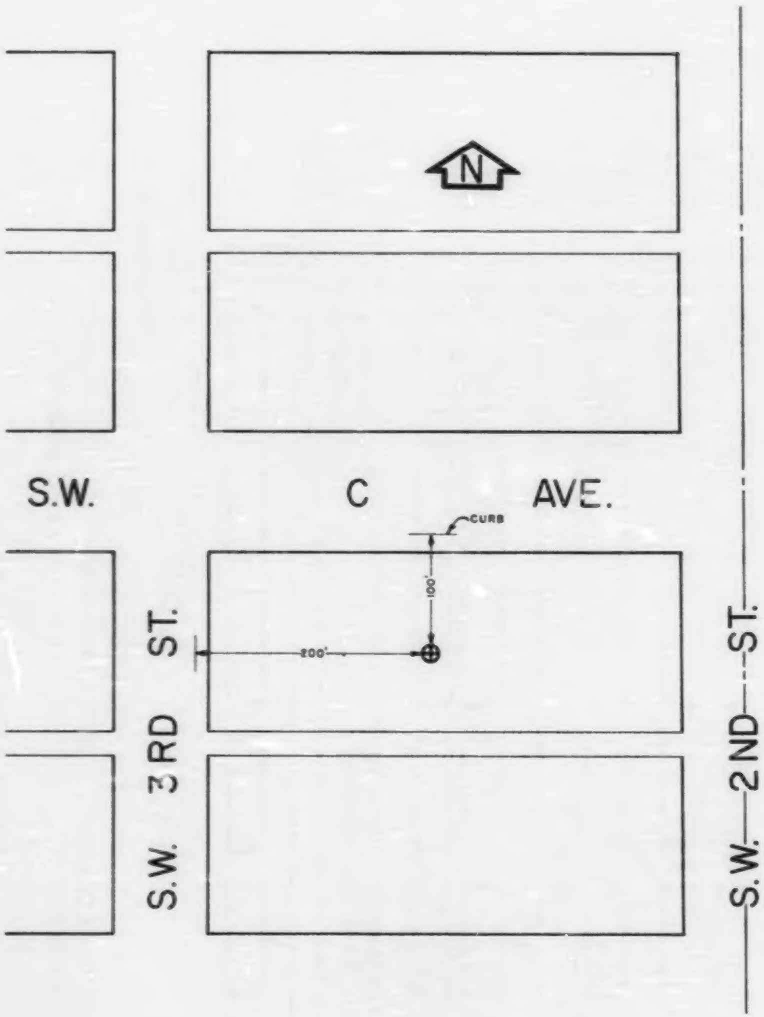
LAND USE

SCALE FEET 0 500

▨ LOW DENSITY RESIDENTIAL
▨ HIGH DENSITY RESIDENTIAL
▩ COMMERICAL
░ PUBLIC FACILITY
☐ VACANT
■ INDUSTRIAL

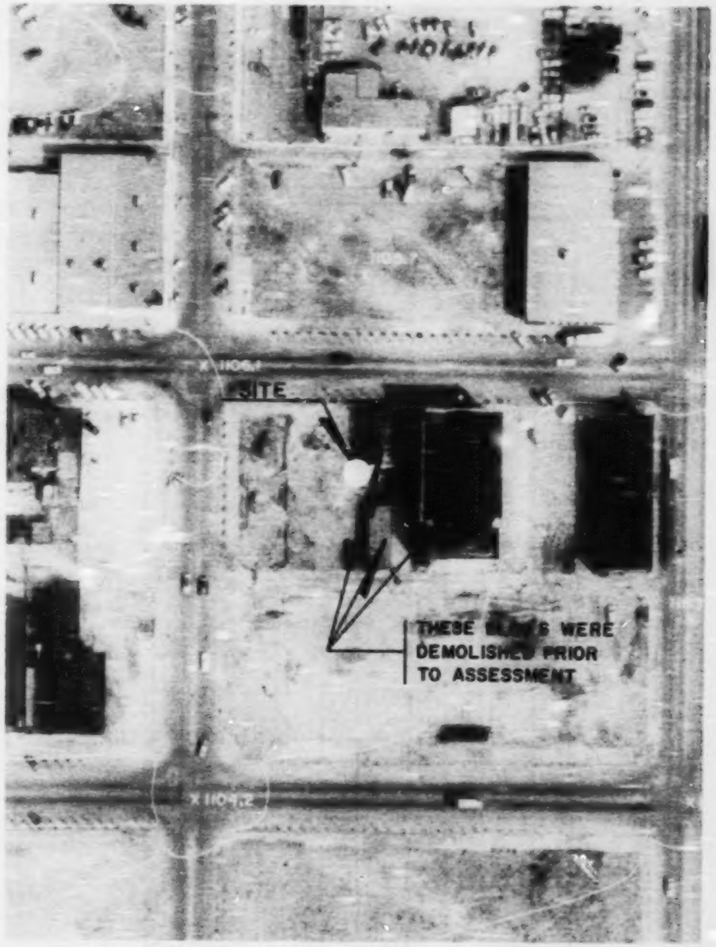
A - 77

CBD SITE # 11


N
S.W. C AVE.
CURB
100'
200'
S.W. 3RD ST.
S.W. 2ND ST.

CBD SITE # 11

SCALE
FEET
0
50
100
200


SITE
THESE [illegible] WERE
DEMOLISHED PRIOR
TO ASSESSMENT

AERIAL PHOTO

N
SCALE
FEET
0
50
100
200

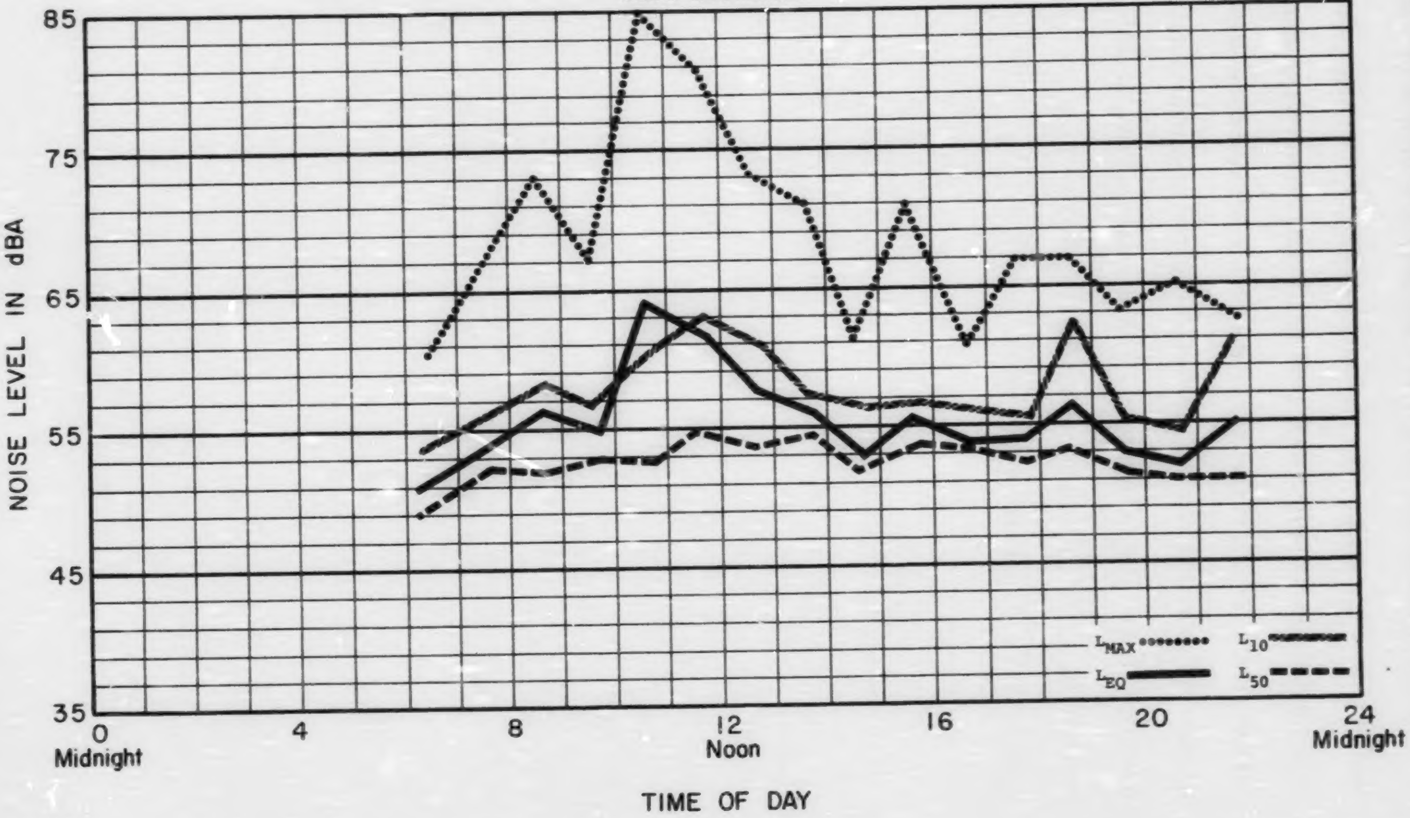
SITE # 11

SUMMARY OF NOISE LEVELS AT S-11 FOR JULY 17, 1975

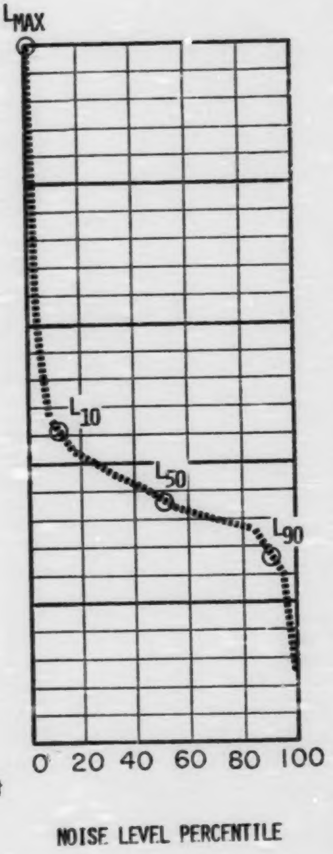
DAILY INFORMATION: L_{MAX} = 85 L_{10} = 58 L_{50} = 52

L_{90} = 49 L_{EQ} = 57 L_{DN} = 57

HOURLY INFORMATION



DAILY NOISE LEVEL DISTRIBUTION



APPENDIX A. 2

This appendix tabulates and compares the data obtained on intrusive noise sources at each site. The actual numbers of intrusive sources observed are indicated in the table and their relative incidence rates are shown on the graph for comparison. The incidence rates are simply the numbers observed divided by the number of hours the site was operated. Intrusive sounds due to animal noises are excluded from the summary. Those observed were not considered to be representative of prevalent sounds in the vicinity since they were due to animals inadvertently in close proximity to the meter.

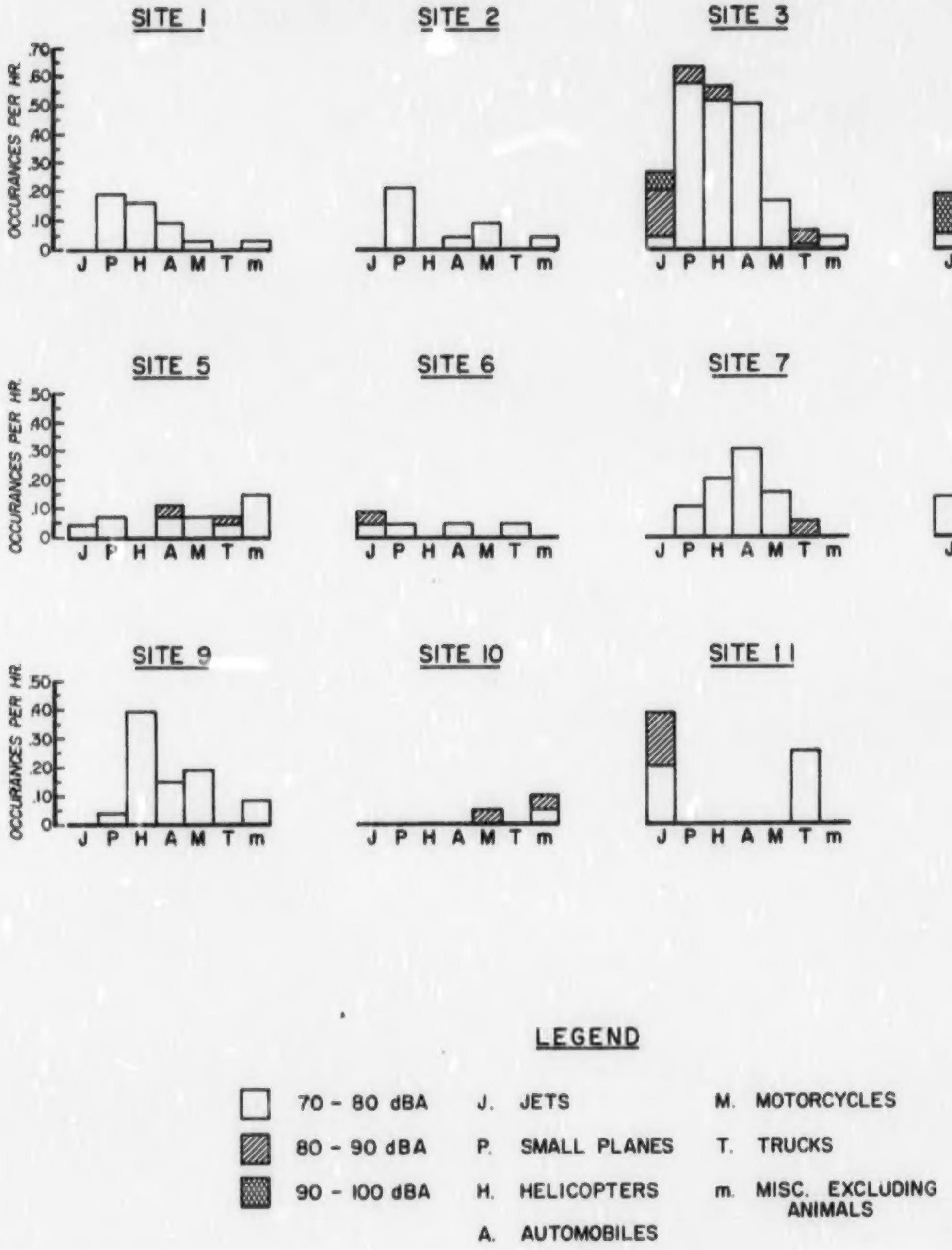
SUMMARY OF IDENTIFIED SOUND SOURCE DATA

SITE NO.	TOTAL HOURS	TOTAL NUMBER OF IDENTIFIED SOUND SOURCES			TOTAL NUMBER OF IDENTIFIED SOURCES OVER 70 dBA BY CATEGORIES						
		70 dBA	Over: 80 dBA	90 dBA	J	P	H	A	M	T	m
1	32	16	0	0	0	6	5	3	1	0	1
2	24	9	0	0	0	5	0	1	2	0	1
3	30	67	10	2	8	19	17	15	5	2	1
4	38	26	9	5	7	8	2	4	0	1	4
5	28	19	2	0	1	2	0	3	2	2	4
6	25	5	1	0	2	1	0	1	0	1	0
7	20	16	1	0	0	2	4	6	3	1	0
8	38	13	0	0	5	2	0	1	3	1	1
9	26	29	0	0	0	1	10	4	5	0	1
10	19	4	2	0	0	0	0	0	1	0	1
11	16	10	3	0	6	0	0	0	0	4	0

Code:

J - Jet
P - Plane
H - Helicopter
A - Auto
M - Motorcycle
T - Truck
m - miscellaneous
(All other sources except animals)

RELATIVE INCIDENCE RATES FOR SOUND SOURCES EXCEEDING 70 dBA AT EACH SITE



APPENDIX B

This appendix contains a description of the City of Lawton and its environs.

APPENDIX B

Lawton, Oklahoma, the county seat of Comanche County, is a city of some 80,000 population. Since its founding in 1901 the economy of the city has been dependent on the continguous US Army Post, Fort Sill. Sounds of weapons firing at Fort Sill reach into the City. The fact that residents accept this condition with little or no complaint is primarily attributable to the fact that it is usually low level and secondarily to the dependence of the economy of the City on the Post. There are two airfields affecting the Lawton environment. The Municipal Airport is centrally located on the south side of the City and US Army Henry Post Field at Fort Sill is just north of the City, also centrally located.

There is little basic industry except for Fort Sill.

The Lawton Metropolitan Area is Comprised of Comanche County with a total of 1,084 square miles, 15th largest of the state's 77 counties. The urbanized area of Lawton, the county seat, contains a majority of the population of the county which also is composed of the unorganized territory of the United States Army Artillery and Missile Center at Fort Sill, the Wichita Mountains Wildlife Refuge, 10 towns, and 19 townships populated primarily by residents engaged in the agricultural and livestock production fields.

Lawton is located at 34.55^{o} north latitude and 98.24^{o} west longitude in the Red Plains region of Oklahoma, a part of the Great Plains of the Midwest. The plains range in elevation between 1,000 and 2,000 feet above sea level, and are broken by the Wichita Mountains northwest of the City in the northern part of the county. At the highest point, the mountain ranges reach an altitude of 2,400 feet ASL, towering about 1,000 feet above the surrounding plains. Geographically, Lawton is located approximately 10 miles from the foothills of the mountains.

In its strategic location, Lawton is the most heavily populated city in Oklahoma south or west of the state capital, Oklahoma City, which is situated 90 miles to the north of Lawton. The nearest metropolitan area to the south of Lawton is Wichita Falls, Texas. Lawton is located within 150 to 160 miles of the Dallas and Fort Worth, Texas, metropolitan areas.

Within a radius of 50 miles of Lawton are located 10 counties comprising almost 11 per cent of the population of the state. Within a radius of 100 miles of Lawton, there are 28 counties with a total population of 1,030,000, some 44 percent of the state's population.

In its Red Plains location, the Lawton Metropolitan Area enjoys an average annual temperature of 62 degrees, an average annual growing season of more than 200 days, and an average rainfall of 30.9 inches of rain. The Red Plains region provides a fertile soil for major agricultural purposes, but contributes less than one-half of one percent of the annual output of minerals in the state which is ranked among the highest oil producing states in the nation.

APPENDIX C

This appendix contains copies of the information sheets provided to those conducting the assessment.

INSTRUCTIONS FOR NOISE MONITORING STATIONS
USING A PULSAR MODEL 40
TYPE 2 SOUND LEVEL METER

General:

One data sheet is to be completed during each hour of operation, always beginning on a clock hour. During the first five minutes of each hour a data sheet is prepared and the meter is checked. Data is taken every 15 seconds during the next 50 minutes. The last five minutes are used in completing the data sheet.

Hourly Schedules:

xx:00 - xx:05 Indicate identifying information on the data sheet and check the the meter.

1. Identifying information: At the top of the sheet, fill in your site (such as DP - 1), name and date, circle the appropriate day of the week, and fill in the times for this data sheet.
2. Meter battery check: Set the meter switch to "batt," and be sure the instrument indicates good batteries. (the small red light comes on). If it does not, replace the batteries (remove the screws on the back) and recheck for a "good" indication. Mark the appropriate blank on the data sheet. Reset the switch to "on".

3. Meter settings check: Make sure that the meter switches are set to 'A' and "fast". Mark the blanks to indicate you have checked the meter settings.

4. Meter calibration check:

   a. Adjust the meter scale switch on the right side (if necessary) so that the meter scale includes sound levels between 90 and 100 decibels.

   b. Depress and release the push button of the calibrator and make sure the tone remains 'on' for more than a few seconds. If it does not, replace the calibrator batteries (unscrew the bottom black part of the calibrator housing).

   c. Remove the windscreen from the microphone and gently place the calibrator on the microphone as far as it will go. Press and release the calibrator push button again and read the meter. Mark this reading in the "calibration end" blank of the preceding hour's data sheet (if any). Use a small screwdriver to adjust the calibration screw on the side so the meter reads 94 dBA. Gently remove the calibrator and replace the microphone windscreen. The calibrator will turn itself off in about one minute after the button on its side was depressed.
   On the data sheet for this hour, mark "94" in the "set to" blank. At the beginning of the next hour you will repeat this procedure

to find out if the meter calibration has changed during the hour.

xx:05 - xx:30 Take data and indicate high level noise sources:

1. Take sound level readings at fifteen second intervals by reading the sound level meter and making a slash mark in the appropriate box on the data sheet. You may adjust the meter scale switch to take a reading if the needle goes off scale.

   On the data sheet the boxes at each noise level are to be be marked in succession, starting at the left. (see sample).

2. If a reading exceeds 70 dBA, rather than simply marking in the appropriate box, write in the box a letter indicating what you hear making the noise. (see sample). For a source listed on the top right of the data sheet, use the letter indicated. For example, if the meter reads 74 dBA and you can hear that a jet is responsible, write 'J' in the next empty box in the 74-76 dBA row. If the source you hear is not listed, write it on one of the blank line below the lists and make up a corresponding symbol to write in the boxes. Indicate your symbol on the listing, being sure it is not already being used for another source (e.g., use a lower case letter).

xx:30 -xx:35 Take 5 minute break

xx:35 -xx:55 Continue recording data

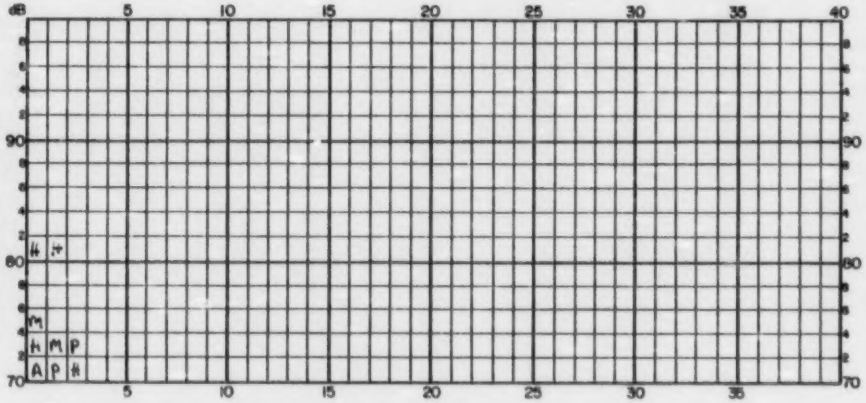
xx:55 -xx:00 Complete data sheet and prepare for next hour.

1. On top right of data sheet, check the blank which best describes this site during this hour.
2. Indicate your opinion about living in an area with this much noise during this part of the day by checking a blank in the "Evaluation" section.
3. On the upper right of the data sheet, circle on the source list those noise sources which you feel have been significant during the hour, i.e., those sources which would have disturbed you if you were living here. This can include sources which did not exceed the 70 dBA level. Leave unmarked those sources not producing problem noises during the hour.
4. If this is the last data sheet for this site repeat the meter calibration check and indicate the 'end' dBA. If another hour of data follows, you will take care of this during the next five minutes.
5. If time allows, count the total number marked of each noise source symbol and indicate that total next to the appropriate symbol in the source lists. For example, if there are two 'H's in the 80-2 row and one in the 72-4 row, one in the 70-2 row, and no other 'H's marked, write the total, four, next to the 'H' in the source list (see sample). Do not include in the total any symbols inadvertently marked in rows below the 70-2 row.

COMMUNITY NOISE ASSESSMENT DATA SHEET

COMMUNITY LAWTON

NO.	TOT.
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	2
11	
12	
13	1
14	3
15	3



STATION NO. 3
OPERATOR Smith
DATE 24 June 1975
DAY S M [✓ T] W T F S
TIME 20:40 TO 21:00

METER CHECK
BATTERY ✓ OK ___ REPLACED
SETTINGS ✓ A ✓ FAST
CALIBRATION SET TO 94.0 dB
END READS 94.2 dB

TRANSPORTATION
E ___ EMER. VEH.
P 2 SMALL PLANE
J ___ JET
[✓ H] 4 HELICOPTER
R ___ RAILROAD
T ___ TRUCK
[✓ A] 1 AUTO
B ___ BUS
M 2 MOTORCYCLE
W ___ WATER CRAFT
V ___ OFF RD. VEH.

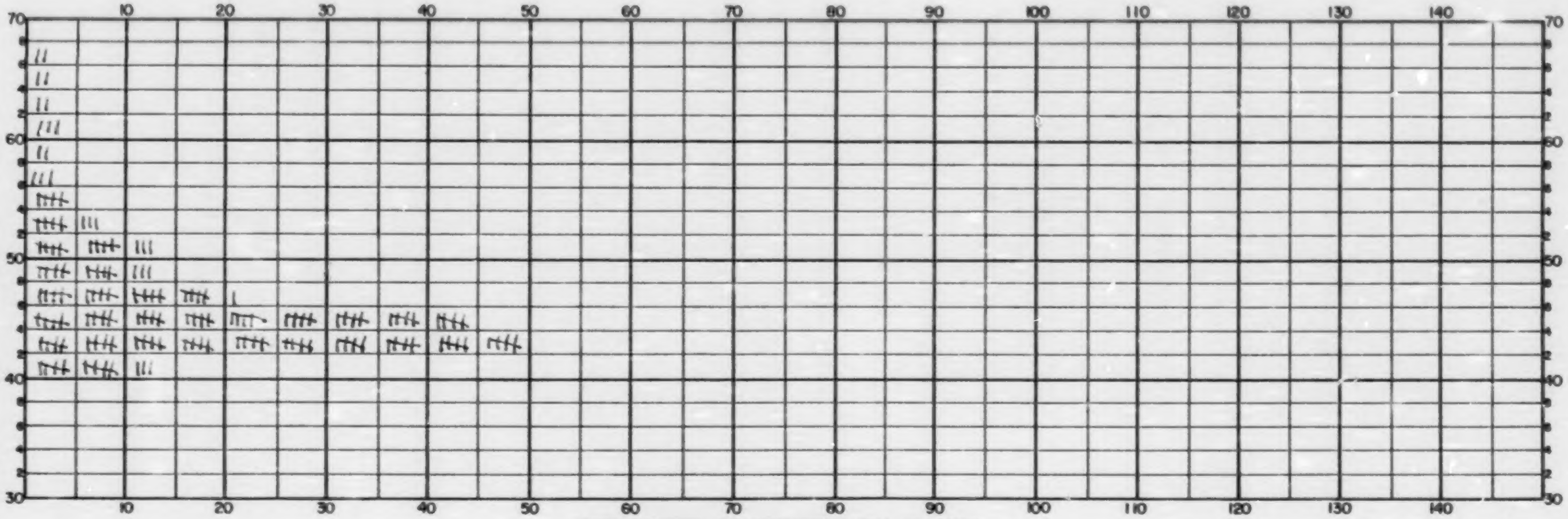
MACHINERY
C ___ CONSTRUCTION EQUIP.
Y ___ YARD MAINT. EQUIP.
F ___ FACTORY EQUIP.
h ___ HOUSEHOLD EQUIP.

OTHER
D ___ DOG
L ___ LOUD SPEAKERS

DESCRIPTION
___ V. QUIET
___ QUIET
✓ M. NOISY
___ NOISY
___ V. NOISY

EVALUATION
___ V. ACCEPT.
___ ACCEPT.
✓ M. UNACCEPT.
___ UNACCEPT.
___ V. UNACCEPT.

NO.	TOT.
16	
17	2
18	2
19	2
20	3
21	2
22	3
23	5
24	8
25	13
26	13
27	21
28	45
29	50
30	13
31	
32	
33	
34	
35	



TOTAL NUMBER OF OCCURANCES PER dB LEVEL

C2 Check List

Required Equipment for each monitoring station

- Type 2 Sound Level Meter
- Windscreen
- Calibrator
- Small Screwdriver
- Tripod
- Timekeeper with sweep second hand
- Lantern (night stations)
- Flashlight (night stations)
- Data sheets
- Clipboard or equivalent
- Marking pens
- Instruction sheet and checklist
- Shipping case
- Spare batteries for all equipment

CHECK LIST FOR STATION OPERATORS

____ have instruction sheet

____ have sound level meter

____ have wind screen

____ have extra batteries (4) for sound level meter

____ know how to change meter batteries

____ have calibrator

____ have extra batteries (2) for calibrator

____ know how to change calibrator batteries

____ have small screwdriver for calibration

____ have tripod

____ have timekeeper with sweep second hand (stopwatch)

____ have watch with time of day

____ have writing board and enough data sheets (one for each hour plus two spares)

____ have two red pens______

____ have ID letter and personal ID

____ know headquarters phone number___________

____ know location of site

____ know microphone location at site

____ know person whom I will go with to site

____ know duration of duty (when I'll be relieved)

____ have lantern (night station)

____ have spare lantern batteries

____ know how to change lantern batteries

____ have flashlight (checked batteries)

____ have folding chair

____ have food and drink

____ have foul weather garments, protection from sun, insects, etc. (protection from sun and insects is essential - wear hats)

A few rules

Do not litter
Do not use umbrellas
Take cover with equipment in case of rain and wait for supervisor
Do not park your vehicle within 50' of instrument

INSTRUMENTS ARE DELICATE!
HANDLE WITH CARE!!
Check in and out at City Hall with shift clerk and shift supervisor.
Do NOT leave City Hall on check out until released by shift supervisor.

C3 WORK SCHEDULES AND TIMETABLES

Roster and Work Schedule

		Report City Hall		
Team	Names	Date	Time	Off
A	Charles Whitis	Fri, June 20	11:30 p.m.	Sat, June 21 - 8:30 a.m.
	Jerry Hammond	Sat, June 21	11:30 p.m.	Sun, June 22 - 8:30 a.m.
		Sun, June 22	11:30 p.m.	Mon, June 23 - 8:30 a.m.
		Mon, June 23	11:30 p.m.	Tue, June 24 - 8:30 a.m.
B	Ed Tahah	Sat, June 21	5:30 a.m.	Sat, June 21 - 2:30 p.m.
	Garfield Bowles	Sun, June 22	5:30 a.m.	Sun, June 22 - 2:30 p.m.
C	Mike McCallis	Mon, June 23	5:30 a.m.	Mon, June 23 - 2:30 p.m.
	R. C. Munn	Tue, June 24	5:30 a.m.	Tue, June 24 - 2:30 p.m.
D	George Ward	Sat, June 21	6:30 a.m.	Sat, June 21 - 3:30 p.m.
	Jimmy L. Lewis	Sun, June 22	6:30 a.m.	Sun, June 22 - 3:30 p.m.
E	Paul Nielsen	Mon, June 23	6:30 a.m.	Mon, June 23 - 3:30 p.m.
	John S. Adams	Tue, June 24	6:30 a.m.	Tue, June 24 - 3:30 p.m.
F	Roy Gilyard	Sat, June 21	7:30 a.m.	Sat, June 21 - 4:30 p.m.
	Phil Baker	Sun, June 22	7:30 a.m.	Sun, June 22 - 4:30 p.m.
		Mon, June 23	7:30 a.m.	Mon, June 23 - 4:30 p.m.
		Tue, June 24	7:30 a.m.	Tue, June 24 - 4:30 p.m.
G	Ivan Stoneberg	Sat, June 21	1:30 p.m.	Sat, June 21 - 10:30 p.m.
	David W. Pettus	Sun, June 22	1:30 p.m.	Sun, June 22 - 10:30 p.m.
H	A. C. James	Mon, June 23	1:30 p.m.	Mon, June 23 - 10:30 p.m.
	Willie L. Long	Tue, June 24	1:30 p.m.	Tue, June 24 - 10:30 p.m.
I	James Russell	Sat, June 21	2:30 p.m.	Sat, June 21 - 11:30 p.m.
	Gary Watkins	Sun, June 22	2:30 p.m.	Sun, June 22 - 11:30 p.m.
J	Clyde Mason	Mon, June 23	2:30 p.m.	Mon, June 23 - 11:30 p.m.
	Eddie Williams	Tue, June 24	2:30 p.m.	Tue, June 24 - 11:30 p.m.
K	Cecil Davidson	Sat, June 21	3:30 p.m.	Sun, June 22 - 12:30 a.m.
	Mike Weatherall	Sun, June 22	3:30 p.m.	Mon, June 23 - 12:30 a.m.
	(Cokefield)	Mon, June 23	3:30 p.m.	Tue, June 24 - 12:30 a.m.
		Tue, June 24	3:30 p.m.	Wed, June 25 - 12:30 a.m.
X	Frank Tartsah	Sat, June 21	8:00 a.m.	Sat, June 21 - 3:00 p.m.
	Gary Shaw	Sun, Juen 22	8:00 a.m.	Sun, June 22 - 3:00 p.m.
	(Hannah)	Mon, June 23	8:00 a.m.	Mon, June 23 - 3:00 p.m.
		Tue, June 24	8:00 a.m.	Tue, June 24 - 3:00 p.m.
Y	Glenn Copeland	Sat, June 21	3:00 p.m.	Sat, June 21 - 10:00 p.m.
	Harold Walters	Sun, June 22	3:00 p.m.	Sun, June 22 - 10:00 p.m.
		Mon, June 23	3:00 p.m.	Mon, June 23 - 10:00 p.m.
		Tue, June 24	3:00 p.m.	Tue, June 24 - 10:00 p.m.
SB	Robert Barnes	On call		
	L. T. Harrison	Sat - Tue	5:30 a.m.	4:30 p.m.
	Dale Brither			
	Edward Chatman			
Sh 1	Bigham - Super		5:30 a.m.	11:30 a.m. daily
	Wayatt - Clerk			
Sh 2	Pondrom - Super		11:30 a.m.	6:00 p.m. daily
	Radford - Clerk			
Sh 3	Thompson - Super		6:00 p.m.	12:30 a.m. daily
	Danna - Clerk			

Date & Time	Shift Supervisor & Shift Clerk	Teams	Remarks
Fri. 20 June & Mon. 23 June 11:30 p.m.	No shift supervisor	Team A meets at City Hall and goes to Site ES.	Team A picks up equipment and Radio Vehicle.
Sat. 21 June 1:00 a.m.	***	Team A starts operations at Site ES.	
3:00 a.m.	***	Take one hour break.	Secure safety of equipment.
4:00 a.m.	***	Resume operations.	
5:30 a.m.	Bigham and shift clerk reports to City Hall and takes Teams B & C to Sites KB & HP.	Teams B & C report to City Hall.	Pick up equipment and check Team B. Takes radio vehicle to Site KB.
6:00 a.m.	Shift clerk commences routine duties at City Hall.	Teams B & C start operations at Sites KB & HP.	
7:00 a.m.	***	D & E start operations at FL & HH.	
7:30 a.m.	Takes Team F to Site ES relieves Team A and returns to City Hall.	Team F reports to City Hall.	
8:00 a.m.	Dispatches Team X on relief cycle.	Team F starts operations at Site ES. Team X reports to Hall and starts relieving Teams B, C, D, E, and F at Sites KB, HP, FL, HH & ES in that order for 30 min. each and repeat until 2:45 p.m. Report off at City Hall at 3 p.m.	Picks up vehicle.

Date & Time	Shift Supervisor & Shift Clerk	Teams	Remarks
Sat. 21 June 8:15 a.m.	Checks with shift clerk and starts visiting sites.		
11:30 a.m.	Pondrom and shift clerk relieves Bigham and clerk. Visits sites. Clerk starts routine duties.	***	
1:30 p.m.	Takes Teams G & H to sites KB and HP.	Teams G & H report to City Hall.	
2:00 p.m.		Teams G & H start operations at Sites KB & HP.	
2:30 p.m.	Takes Teams I & J on relief cycle. Checks with shift clerk and visits one site.	Teams I & J report to City Hall.	
3:00 p.m.	Dispatches Team Y on relief cycle. Checks with shift clerk and visits one site.	Teams I & J start operations at Sites HH & FL. Team Y reports to City Hall, picks up vehicle and starts relieving teams at Sites KB, HP, FL, HH and ES in order for 30 min. each and repeat until 9:45 p.m. Report off at City Hall at 10 p.m.	
3:30 p.m.	Takes Team K to Site ES and continues site visits until 6 p.m. Return to City Hall.	Team K reports to Cith Hall.	
4:00 p.m.		Team K starts operations at Site ES.	
6:00 p.m.	Thompson & Clerk relieves Pondrom & clerk at City Hall. Resume site visits.	***	

Date & Time	Shift Supervisor & Shift Clerk	Teams	Remarks
Sat. 10:00 p.m.	Relieves Team H at Site HP and returns to City Hall.	Team Y reports off at City Hall and leaves vehicle. Team G stops operations at Site KB, returns to City Hall in radio vehicle, report off.	Leave vehicle at City Hall.
11:00 p.m.	Relieves Teams I & J to Sites HH & FL and returns to City Hall.		
11:30 p.m.	Takes Team A to Site MA.	Team A reports to City Hall.	
11:45 p.m.	XXXXX	Team K moves equip. to Site MA, meets supervisor. Sat. night only.	Leaves radio vehicle at Site MA Sat. night only.
12:00	Returns to City Hall with Team K and reports off with clerk.	Team A starts operations at Site MA. Sat. night only.	Lock City Hall.

C4 Shift supervisor instructions

1. Take charge
2. Verify that crews have all checked that they have equipment needed.
3. Carry extra batteries, forms, pens, insect repellent, water, salt tablets, leaf bags, etc.
4. Take teams to sites and be certain they will be able to start operations on time.
5. Insure that shift clerk know where you will be at all times. Call in deviations from itinerary.
6. Insure that shift clerk is
   a. Preparing forms with new headings.
   b. Transcribing data from data recording forms to "mark sense" forms.
   c. Keeping time cards on "summer hires".
7. Check that data recording sheets are completely filled out before turn in.
8. Observe to see that operators are performing duties properly. Observe instruments and compare with recording current and past. Observe for littering. Solve problems; take emergency action as required.
9. When teams are relieved be certain that all equipment is turned in (or turned over to next team), data sheets are turned in, and clerk has time record in and out.
10. Know names and telephone numbers of stand-bys.
11. Relieve teams in case of rain.

****

Shift clerk instructions

1. Follow instructions of shift supervisor, otherwise:
2. Know where shift supervisor is.
3. Work on data sheet headings, "mark sense" sheets, or time sheets.
4. Answer telephone - refer problems to supervisor (in emergency to Paul Cullen)
5. Help supervisor check teams in and out.

APPENDIX D

This appendix contains a sample copy of the data coding forms, a description and listing of the computer program used in analyzing the data, and a sample printout.

Coding Form for Community Noise Assessment Data Sheets

Page 1

Sheet				Sta. No.		Date				Wk. Day	Start Hour			Rating		Source Counts: Transportation													
Number			Pg			Mo.		Date						Des	Evl	EmVh		SmPln		Jet		Copter		Rail		Truck		Auto	
●	0	0	0	●	0	●	0	0	0	0	0	●	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	●	●	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	●
2	●	2	2	2	2	2	2	●	2	2	●	2	2	2	2	2	2	2	●	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	●	3	3	3	3	●	3	3	3	●	●	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	●	4	4	4	4	4	4	4	4	4	4	4	4	4	●	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	●	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

Con't.										Source Counts: Equipment										Source Counts: Misc									
Bus		Cylce		RecVh		WCrft				Cnstr		Yard		Fctry		House				Dogs		LSpkr							
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	●	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60

Bin Counts																			
1		2		3		4		5		6		7		8		9		10	
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	●
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

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Coding Form GENERAL CODING FORM **Page 2**

Bin Counts																													
11			12			13			14			15			16			17			18			19			20		
								1			3			3						2			2			2			3
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

21			22			23			24			25			26			27			28			29			30		
		2			3			5			8		1	3		1	3		2	1		4	5		5	0		1	3
31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60

31			32			33			34			35				Sheet Number			Pg
																0	2	1	2
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

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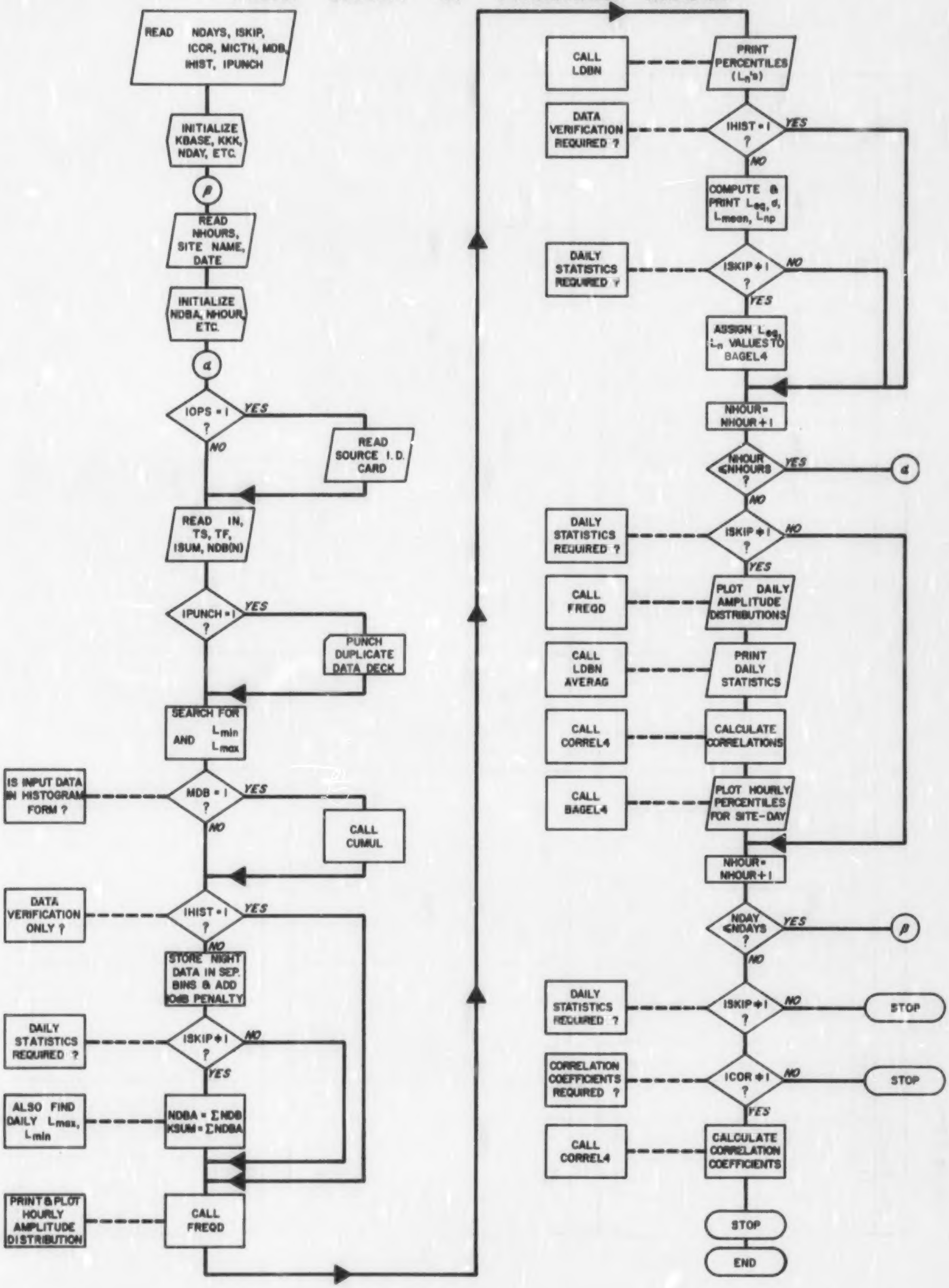
FLOW CHART OF PROGRAM MODOP


READ NDAYS, ISKIP, ICOR, MICTH, MDB, IHIST, IPUNCH
INITIALIZE KBASE, KKK, NDAY, ETC.
β
READ NHOURS, SITE NAME, DATE
INITIALIZE NDBA, NHOUR, ETC.
α
IOPS = 1 ?
YES
NO
READ SOURCE I.D. CARD
READ IN, TS, TF, ISUM, NDB(N)
IPUNCH = 1 ?
YES
PUNCH DUPLICATE DATA DECK
SEARCH FOR L_{min} AND L_{max}
IS INPUT DATA IN HISTOGRAM FORM ?
MDB = 1 ?
YES
NO
CALL CUMUL
DATA VERIFICATION ONLY ?
IHIST = 1 ?
YES
NO
STORE NIGHT DATA IN SEP. BINS & ADD 10dB PENALTY
DAILY STATISTICS REQUIRED ?
ISKIP ≠ 1 ?
NO
YES
ALSO FIND DAILY L_{max}, L_{min}
NDBA = ΣNDB KSUM = ΣNDBA
PRINT & PLOT HOURLY AMPLITUDE DISTRIBUTION
CALL FREQD
CALL LDBN
PRINT PERCENTILES (L_n's)
DATA VERIFICATION REQUIRED ?
IHIST = 1 ?
YES
NO
COMPUTE & PRINT L_{eq}, σ, L_{mean}, L_{np}
DAILY STATISTICS REQUIRED ?
ISKIP ≠ 1 ?
NO
YES
ASSIGN L_{eq}, L_n VALUES TO BAGEL4
NHOUR = NHOUR + 1
NHOUR ≤ NHOURS ?
YES
α
NO
DAILY STATISTICS REQUIRED ?
ISKIP ≠ 1 ?
NO
YES
CALL FREQD
PLOT DAILY AMPLITUDE DISTRIBUTIONS
CALL LDBN AVERAG
PRINT DAILY STATISTICS
CALL CORREL4
CALCULATE CORRELATIONS
CALL BAGEL4
PLOT HOURLY PERCENTILES FOR SITE-DAY
NHOUR = NHOUR + 1
NDAY ≤ NDAYS ?
YES
β
NO
DAILY STATISTICS REQUIRED ?
ISKIP ≠ 1 ?
NO
STOP
CORRELATION COEFFICIENTS REQUIRED ?
ICOR ≠ 1 ?
NO
STOP
YES
CALL CORREL4
CALCULATE CORRELATION COEFFICIENTS
STOP
END

MODOP

APPLICATIONS OF MODOP:

1. Hand-held meter data reduction.
2. B & K Environmental Noise Classifer data reduction.
3. EPA Noise Monitoring System developed by CERL personnel and Kamperman & Associates.

Limitation of MODOP:

1. Range of noise levels is 35-109 dB. If range increase is desired, follow steps given below:
    - (a) Value of KKK should be increased by the same amount.
    - (b) If a new baseline is desired, change KBASE accordingly.
    - (c) Proportionate increase in the dimensions of NDB, NDBA, LDB, LDBA, and DBP.
2. A maximum of 30 site-days can be handled at a time.
3. Total number of samples for any hour cannot equal zero. In other words, this program will not accept blank hours.

Description of What MODOP Does:

MODOP performs following functions:

(a) Prints source identification.

(b) Prints and plots frequency and cumulative distributions.

(c) Calculates L_ns and L_{eq}. The program uses Lagrangian interpolation to determine the L_ns.

(d) Performs the same for the whole site-day.

(e) Finds correlation coefficients

$r_{eq,10}$= correlation between L_{eq} and L_{10}

$r_{eq,50}$= correlation between L_{eq} and L_{50}

$r_{50,10}$= correlation between L_{50} and L_{10}

(f) Plots L_0,L_1, L_{10},L_{50},L_{90} and L_{eq} statistics for the site-day.

(g) Will punch out a duplicate data deck, if desired.

(h) If desired, can reduce demand-periodic data.

Input to MODOP

Note that in a free-format field, either a comma or one or more blanks could be used as a delimiter. Most of the cards are read in free-format, in this program; for savings in data punching time. Instead of punching a series of five tens, as in a fixed format for example; a simple 5 10 does the trick in a free format, you could change the format, if so desired.

The following is an illustration of how the data cards should be ordered:

		NDAYS Card
		SITE-DAY Card
NDAY = 1	NHOUR = 1	(Optional) SOURCE Card TIME & BIN Cards
	NHOUR = 2	(Optional) SOURCE Card TIME & BIN Cards
		repeat until NHOUR = NHOURS
		SITE-DAY Card
NDAY = 2	NHOUR = 1	(Optional) SOURCE Card TIME & BIN Cards
		repeat until NHOUR = NHOURS repeat until NDAY = NDAYS

1. NDAYS CARDS:

READ *, NDAYS, ISKIP, ICOR, MICTH,MDB, IHIST, IPUNCH, IOPS,

WHERE

NDAYS = number of SITE-DAYS

ISKIP = 0, if daily statistics including L_n plot is required.

ISKIP = 1, if daily statistics including the L_n plot is not required.

ICOR = 0, if correlation-coefficients are required.

ICOR = 1, if correlation coefficients are not required.

MICTH = 0

MDB = 1

IHIST = 0

IHIST = 1, if hourly distributions are required only, for data verification purposes.

IPUNCH = 0, if punched data deck not required.

IPUNCH = 1, if punched data deck is required.

IOPS = 0, if source identification is not recorded.

IOPS = 1, if source identification is recorded.

2. SITE-DAY CARD: Read

cols. 2-5: NHOURS, the number of blocks of data for the site-day (I 4).

cols. 6-55: Print the name of the site, location and other information (Alphameric format).

cols. 56-67 Print the data (Alphameric format).

3. (Optional) SOURCE CARD:

Include this card, only if IOPS = 1 in the NDAYS card.

READ *, (ISOUR (I), I = 1, 19)

where

ISOUR (1) = Rating Description

ISOUR (2) = Rating Evaluation

ISOUR (3) = to ISOUR (13) = Transportation Source Counts in following order: Emergency vehicles, small planes, jet aircrafts, helicopters, trains,trucks, automobiles, buses, motorcycles, recreation vehicles, water craft

ISOUR (14) to ISOUR (17) = Equipment Source Counts in the following order: construction, yard, factory, house

ISOUR (18) to ISOUR (19) = Miscellaneous Source Counts: dogs, loudspeakers

4. TIME & BIN CARDS:

In this card, you read the time of hour and the bin counts.

READ *, IN, TS, TF, ISUM, NDB (35dB to 109dB)

where

IN = sheet or page number (integer)

TS = time started (floating)

TF = time stopped (floating)

ISUM = total number of samples for the hour (integer)

NDB = number of sample counts in each bin starting from the 35dB bin. For hand-held meter data, enter twice the number of samples in each bin to avoid fractions and ensure greater accuracy. Thus the total number of samples would be twice as many. For classifier data, multiply the2-dB width counts by a factor of 3 and the 3-dB width counts by a factor of 2. The total number of samples would then be six times the original (even though the total number of samples is increased, this will not affect the statistics).

IF FURTHER INFORMATION IS REQUIRED
WRITE TO:

Hal Watson,Jr., Ph. D.
CE/ME Dept., IOT
SMU
Dallas, Texas 75275

GLOSSARY

NDAYS = Number of SITE-days

ISKIP = Control for skipping daily statistics

ICOR = Control for skipping correlation coefficeients

MICTH = Demand-periodic model number = 0

MDB = Control for whether data input in histogram form (1) of cumulative form (0)

IHIST = Control for data vertification

IPUNCH = Control for punching out duplicate data deck

IOPS = Control for source I.D. information card

KBASE = Minimum baseline level handled by program MODOP = 35

KKK = Dynamic range of the program = 75

NHOURS = Number of blocks/hours of data for the given site-day

NDB (N) = Number of samples in bin N for the given hour

NDBA (N) = NDB (N) for the site-day

IN = Sheet/block number

TS = Time start

TF = Time finish

ISUM = Total number of samples for the given hour

KSUM = E ISUM

NOTE: It is suggested to verify data (IHIST = 1) on first run

SUBROUTINES

1. CUMUL : Finds cumulative distribution from frequency distribution
2. FREQD : Prints and plots both frequency and cumulative distributions

3. **LDBN** : Uses Lagrangian interpolation to find the percentiles

4. **AVERAG** : Computes L_{eq}, L_{mean}, median L, and variance of the distribution

5. **CORREL 4**: Calculates correlation coefficients up to four variables; in our case:

$r_{eq, 10}$ = correlation between L_{eq} and L_{10}

$r_{eq, 50}$ = correlation between L_{eq} and L_{50}

$r_{50, 10}$ = correlation between L_{50} and L_{10}

6. **BAGEL4**: Plots L_0, L_1, L_{10}, L_{50}, L_{90} and L_{eq} statistics for the given site-day

SAMPLE COMPUTER LISTING
AND PRINTOUT

(D 13 - 29)

```
      PROGRAM MODUP(INPUT,OUTPUT,PUNCH,TAPE5=INPUT,TAPE6=OUTPUT,TAPE9=
     1PUNCH)
      DIMENSION  SITE(10),NDB(76),NDBA(76),LDB(86),LDBA(86),DBP(76),
     1IA(4),Y(1,7,97),   AL10(24),AL50(24),ALEQ(24) ,ISOUR(19)
     4,AAL10(30),AAL50(30),AALEQ(30),DDEL(30),DEL(24),          ALM(24)
      COMMON/LEQ/KKK/BAG/MON,DAY,YEAR,SITE/FREQ/KBASE,FAC/LUMP/L1,L2/
     1MODEL/THRESK,SPREAD,RATIO,TSUM,MICTH
      REAL      LDN,LNP,JAL,LUMM,NPL,L50
      INTEGER   THRESH,THRESK,DAY,DBP,SPREAD
C************************************************************************
C
C
C   THIS PROGRAM IS GOOD FOR NOISE-LEVELS THAT FALL BETWEEN 35DB AND 109DB
C          CAUTION - DONT OVERLOOK
C   IF NDAYS IS GREATER THAN 30 THEN,
C        CHANGE DIMENSIONS IN CONTINUATION CARD 4 ABOVE
C      ISKIP = 1,  IF DAILY STATISTICS + BAGEL NOT REQUIRED
C      ICOR = 1,   IF CORRELS AFTER BAGEL NOT REQUIRED
C      MICTH = 0,   IF NOT DEMAND-PERIODIC  IE  REGULAR DATA
C      MICTH = 1,   IF DEMAND-PERIODIC HAS LINEAR MODEL
C      MICTH = 2,   IF DEMAND-PERIODUC HAS EXPONENTIAL MODEL
C      MICTH = 3,   IF DEMAND-PERIODIC HAS PARABOLIC MODEL
C      MDB = 1,   IF INPUT IS HISTOGRAM IF  FREQ DISTRIBUTION
C      IHIST =1,   IF HISTOGRAM IS DESIRED ONLY
C      IPUNCH = 1,   IF DATA CARDS TO PUNCHED IN HISTOGRAM OUTPUT
C      IOPS = 1,   IF SOURCE COUNTS ARE TO BE RECORDED
C     READ *,  NDAYS,ISKIP,ICOR,MICTH,MDB,IHIST,IPUNCH ,IOPS
C      IF MICTH=1,   READ*,   RATIO,THRESH,SPREAD
C      READ 10,   NCASES,SITE,DATE
C      IF IOPS=1,   READ *,   ISOUR(I),I=1,19
C      READ*,   IN,IS,IF,ISUM,DBP(1,KKK)
C
C************************************************************************
   55 FORMAT(120(1H*))
   72 FORMAT(1X,2H  )
   73 FORMAT(1H1)
      NP = 97
      KBASE = 35
      KKK = 75
      RATIO = 1.0
      THRESH = KKK+KBASE +30
      FAC = 100.
      LLL=KKK+5
      LKK=KKK+1
      NF1=ND2=7
      SPREAD = 0
      NDAY=1
      READ *,  NDAYS,ISKIP,ICOR,MICTH,MDB,IHIST,IPUNCH,IOPS
      IF(IHIST .EQ. 1)   ISKIP=ICOR=1
      IF(MICTH .EQ. 1)   MODNAME = 7HLINEAR
      IF(MICTH .EQ. 2)   MODNAME = 7HEXPONTL
      IF(MICTH .EQ. 3)   MODNAME = 7HPARABOL
      IF(MICTH.NE.0)   READ *,   RATIO,THRESH,SPREAD
      IF(IPUNCH.NE.0.AND.MICTH.NE.0)   PUNCH *,  RATIO,THRESH,SPREAD
      THRESK = THRESH-KBASE+1
C
 2000 CONTINUE
```

```
C
      WRITE(6,73)
C
C         NDAYS = NUMBER UF DAYS                                (I5)
C         NCASES = NUMBER OF DATA READINGS IN A DAY                  (I4)
C                  USUALLY , NUMBER OF HOURS OF DATA IN A DAY
C         SITE = SITE NAME                                     (10A5)
C         MON = MONTH
C         DAY = DAY
C      KBASE = BASELINE LEVEL IN UH
C      FAC = CORRESPONDS TO THE DECIMAL PLACE IN CDF
C
      READ(5,10)NCASES,(SITE(I),I=1,10),MON,DAY,YEAR
      IF(IPUNCH,NE,0) WRIIE(9,10)NCASES,(SITE(I),I=1,10),MON,DAY,YEAR
   10 FORMAT(1X,I4,10A5,3A4)
      WRITE (6,50)
      WRITE (6,51)  (SITE(I),I=1,10)
   51 FORMAT (3X,7HSITE = ,10A5)
      WRITE (6,52) MON,DAT,YEAR ,NCASES
   52 FORMAT(3X,7HDATE = ,3A4,15X,8HSHEETS =,I4)
      IF (MICTH .NE. 0)   WRITE(6,55) RATTO,THRESH,SPREAD,MODNAME
   55 FORMAT(10X,*TIME COMPRESSION RATIO = *,F5.2,10X,*DEMAND THRESHOLD
     1LEVEL = *,I3,10X,*SPREAD = *,I3,10X,A7,1X,*MODEL*)
      WRITE(6,50)
      DO 100 M=1,KKK
      LDR(M) = 0
      LDRA(M) = 0
      NDRA(M)=0
  100 CONTINUE
      DO 99 M = LKK,LLL
      LDR(M)=0
      LDBA(M)=0
   99 CONTINUE
      IF(ISKIP .EQ. 1)   GO TO 96
      DO 95 II = 1,NFL
      DO 95 JJ = 1,NP
   95 Y(1,II,JJ) = 0.
   96 CONTINUE
      KSUM=0
      MMAX=0
      MMIN=500
      NCASE=1
      TS=00.00
      TF=00.00
      KDAY=0
      NIGHT=0
C
 1000 CONTINUE
C
C
C        READ IN NUMBER OF SAMPLES
C
C         NDB(N) = NUMBER OF SAMPLES IN BIN N
C         NDBA(N) = NDB(N) FOR WHOLE DAY
C         ISUM = SUMMATION OF NDB(N) FOR THE HOUR=NUMBER OF SAMPLES FOR THE HOUR
C         KSUM = SUMMATION OF NDBA(N) FOR THE DAY
C
```

```
      C             IN = SHEET NUMBER
      C            TS = TIME  START
      C             TF = TIME FINISH
      C             NSUM = TOTAL NUMBER OF SAMPLES/100
      C             DBP(I) = PERCENT OF THE TIME LEVEL EXCEEDS BIN *I*
            WRITE(6,72)
            DO 53 I = 1,LKK
            DBP(I) = 0.
            NDB(I) = 0
         53 CONTINUE
            IF(IOPS.EQ.1) READ *,   (ISOUR(I),I=1,19)
            DO 47 I = 1,19
            IF (ISOUR(I) .LT. 0)   ISOUR(I) = 0
         47 CONTINUE
            READ *,   IN,TS,TF,ISUM,(DBP(I),I=1,KKK)
            IF(IOPS.NE.1)WRITE(6,59) NCASE,(SITE(I),I=1,10),MON,DAY,YEAR
         59 FORMAT(2X,I3,5X,18HHOURLY INFORMATION,5X,10A5,10X,3A4/)
            IF(IOPS.EQ.1)WRITE(6,60) NCASE,(SITE(I),I=1,10),ISOUR(1),ISOUR(2)
           1 ,MON,DAY,YEAR
         60 FORMAT(2X,I3,5X,18HHOURLY INFORMATION,5X,10A5,*,RATING-DES=*,I1,
           1*,EVL=*,I1,5X,3A4/)
            IF (MDB .EQ. 1)   GO TO 102
            DO 54 IJ = 1,KKK
            NDB(IJ) = ISUM*(DBP(IJ)-DBP(IJ+1))*RATIO/(100.*FAC) + .5
            IF (NDB(IJ) .LT. 0)   GO TO 999
         54 CONTINUE
            GO TO 103
        102 CONTINUE
            DO 56 IJ = 1,KKK
            NDB(IJ) = DBP(IJ)
            NDB(IJ) = NDB(IJ)*RATIO
         56 CONTINUE
        103 CONTINUE
            WRITE (6,61)  TS,TF ,IN,ISUM
         61 FORMAT(3X,6HHOUR =,3X,F5.2,1H-,F5.2,5X,13HSHEET NUMBER=,I3,
           110X,19HNUMBER OF SAMPLES =,I7)
            IF(IOPS.EQ.1) WRITE(6,21) (ISOUR(I),I=3,13)
         21 FORMAT(1X,*SOURCE COUNTS(TRANSPORTATION),EMVH=*,I2,*,SMPL=*,I2,*,J
           3ET=*,
           1 I2,*,COPT=*,I2,*,RAIL=*,I2,*,TRUCK=*,I2,*,AUTO=*,I2,*,BUS=*,I2,*,
           4CYC=*,I2
           2 ,*,RECVH=*,I2,*,WCHFT=*,I2)
            IF(IOPS.EQ.1) WRITE(6,22)(ISOUR(I),I=14,19)
         22 FORMAT(1X,*SOURCE COUNTS (EQUIP),CNSTR=*,I2,*,YARD=*,I2,*,FCTRY=*,
           1 I2,*,HOUSE=*,I2,*,   (MISC) DOGS=*,I2,*,LSPKR=*,I2)
            IF(IPUNCH.NE.0) PUNCH*, IN,TS,TF,ISUM,(NDB(I),I=1,10)
            IF(IPUNCH.NE.0) PUNCH*,(NDB(I),I=11,25)
            IF(IPUNCH.NE.0) PUNCH*,(NDB(I),I=26,40)
            IF(IPUNCH.NE.0) PUNCH*,(NDB(I),I=41,55)
            IF(IPUNCH.NE.0) PUNCH*,(NDB(I),I=56,KKK)
            IF (MICTH .NE. 0)   WRITE(6,55) RATIO,THRESH,SPREAD,MODNAME
      C             SEARCH FOR LMIN
            DO 704 N =1,KKK
            IF(NDB(N)-1)  704,701,701
        701 CONTINUE
            LMIN = N+BASE-1
            GO TO 702
```

```
  701 CONTINUE
C           SEARCH FOR LMAX
  702 CONTINUE
      DO 703 N =1,KKK
      MPP=KKK-N+1
      IF(NDB(MPP)-1)  703,705,705
  705 CONTINUE
      LMAX = MPP+KBASE-1
      GO TO 706
  703 CONTINUE
  706 CONTINUE
      L1 = LMIN-KBASE+1
      L2 = LMAX-KBASE+1
      IF (MICTH .NE. 0)     CALL MODELS(NDB,MDH,DBP)
      IF (MICTH.EQ.0.AND.MDB.EQ.1)      CALL CUMUL(NDB,ISUM,DBP)
      WRITE (6,63)
   63 FORMAT( 6X,3HDBA,6X,21HNUMBER OF OCCURRENCES,30X,*ATTENTION: THE F
     1REQUENCY DISTRIBUTION IS NORMALISED*,8X,*CUMUL DISTR*)
      IF(IHIST .EQ. 1)     GO TO 2010
C           CONTROL FOR NIGHTTIME PENALTY
      IF(TF.LE.7.20.OR.TF.GT.22.20)  GO TO 521
      KDAY=KDAY+1
      DO 116 I=1,KKK
      LDB(I)=NDB(I)
  116 CONTINUE
      DO 715 I = LKK,LLL
      LDB(I) = 0
  715 CONTINUE
      GO TO 525
  521 CONTINUE
C           APPLY 10DB PENALTY FOR NIGHT
      NIGHT=NIGHT+1
      DO 716 I = 1,5
      LDB(I) = 0
  716 CONTINUE
      DO 115 KL=1,KKK
      LP=KL+5
      LDB(LP) = NDB(KL)
  115 CONTINUE
  525 CONTINUE
      IF(ISKIP .EQ. 1)   GO TO 2010
C          SUMMATION OF NUMBER OF SAMPLES FOR THE DAY
      DO 105 JJ=1,KKK
      NDBA(JJ)=NDB(JJ)+NDBA(JJ)
  105 CONTINUE
      DO 110 JJ = 1,LLL
      LDBA(JJ)=LDB(JJ)+LDBA(JJ)
  110 CONTINUE
      KSUM=KSUM+ISUM
      IF(LMAX.GT.MMAX)  MMAX=LMAX
      IF(LMIN.LT.MMIN)  MMIN=LMIN
C          PRINT OUT AMPLITUDE DISTRIBUTION
C            CALCULATE LN#S
C       PRINT OUT LN#S,INI AND LNP (GAUSSIAN)
 2010 CONTINUE
C*************************************************************************
      CALL FREQD(NDB,DBP,ISUM,LMIN,LMAX)
```

```
            WRITE (6,76) LMAX
            CALL LOBN(DBP,JAL)
            WRITE(6,83)  LMIN
      C************************************************************************
            IF(IHIST .EQ. 1)    GO TO 97
         76 FORMAT(10X,7HLMAX = ,I3)
         83 FORMAT (10X,7HLMIN = ,I3/)
         84 FORMAT (3X,6HTNI = ,F5.1,20X,14HVARIANCE (L) =,F7.4,10X,10HMEAN (L) =,
           1) =,F7.4)
         85 FORMAT(3X,17HLNP (GAUSSIAN) = ,F5.1,5X
           1,34H LNP=85 MAX FOR AIRCRAFT SUGGESTED)
      C   CALCULATE LNP (GAUSSIAN) AND TNI
            DD = JAL(1)-JAL(3)
            NPL=JAL(2)+DD+DD*DD/60.
            TNIM=4.*DD+(JAL(3)-30.)
            L50= JAL(2)
      C            COMPUTE LAV AND MEAN
      C            COMPUTE SIGMA AND LNP
      C************************************************************************
            CALL AVERAG(NDB,ISUM,LMAX,LMIN,VE,AV,AMEAN,VAR)
      C************************************************************************
            SIG = SQRT(VAR)
            WRITE (6,84)  TNIM ,VAR,VE
            WRITE (6,85)  NPL
            ALFQOM = AV/AMEAN
            WRITE(6,87)  AV
            WRITE (6,69)   AMEAN,ALFQOM
            LNP=AV+2.56*SIG
            WRITE(6,89)  LNP
         69 FORMAT(3X,6HLMEAN=,F5.1,5X,10HLEQ/LMEAN=,F6.3)
            WRITE (6,72)
            WRITE (6,50)
            WRITE(6,73)
            IF(ISKIP .EQ. 1)   GO TO 97
      C************************************************************************
      C     NOTE!  GRAPH NUMBER 1 REPRESENTS L10 STATISTIC
      C     NOTE!  GRAPH NUMBER 2 REPRESENTS L50 STATISTIC
      C     NOTE!  GRAPH NUMBER 3 REPRESENTS LEQ STATISTIC
      C     NOTE!  GRAPH NUMBER 4 REPRESENTS LMAXSTATISTIC
      C
            TMS = TS+(TS-IFIX(TS))*10./6.
            TMF = TF+(TF-IFIX(TF))*10./6.
            TMX = (TMS+TMF)/2.
            IF(TMF .LT. TMS)    TMX = (TMS+24.+TMF)/2.
            NPX = TMX*4.+1.
            IF(NPX .GT. 97.)    NPX = NPX-97.
      C************************************************************************
            Y(1,1,NPX) = JAL(1)
            Y(1,2,NPX) = JAL(2)
            Y(1,3,NPX) = AV
            Y(1,4,NPX) = LMAX
            Y(1,5,NPX) = JAL(3)
            Y(1,6,NPX) = JAL(4)
            IF(TMF .LT. TMS)     Y(1,7,NPX) = 35.
            AL10(NCASE)=JAL(1)
            AL50(NCASE)=JAL(2)
            ALEQ(NCASE)=AV
```

```
          DEL(NCASE) = ISUM
          ALM(NCASE) = AMEAN
C***********************************************************************
          IF(NCASE.EQ.1)   XI=TMS
       97 NCASE=NCASE+1
          IF(NCASE.LE.NCASES)  GO TO 1000
          IF(ISKIP .EQ. 1)   GO TO 996
C***********************************************************************
C          START CALCULATIONS FOR THE WHOLE DAY
C                FIND PERCENT OF TOTAL
C***********************************************************************
C              COMPUTE LAV AND MEAN
C                COMPUTE LDN
C          FIND SIGMA AND LNP
C    PRINT OUT AMPLITUDE DISTRIBUTION FOR THE DAY
          CALL AVERAG(NDBA,KSUM,MMAX,MMIN,AVE,AAVER,DAMEAN,VARDAY)
          CALL AVERAG(LDBA,KSUM,MMAX,MMIN,LUMM,LDN,DNMEAN,VARDN)
          WRITE (6,72)
          WRITE(6,86)  NDAY,(SITE(I),I=1,10),MON,DAY,YEAR
          WRITE (6,63)
          L1 = MMIN-KBASE+1
          L2 = MMAX-KBASE+1
          CALL CUMUL(NDBA,KSUM,DBP)
          CALL FREQD(NDBA,DBP,KSUM,MMIN,MMAX)
          SIGM = SQRT(VARDAY)
C***********************************************************************
          DEQOM = AAVER/DAMEAN
          LNP=AAVER+2.56*SIGM
       86 FORMAT(1X,I3,10X,17HDAILY INFORMATION,5X,10A5,3A4/)
          WRITE (6,72)
          WRITE (6,76)  MMAX
          CALL LDBN(DBP,JAL)
          WRITE (6,83)  MMIN
          TNID=4.*(JAL(1)-JAL(3))+(JAL(3)-30.)
          WRITE (6,84)   TNID,VARDAY,AVE
          WRITE(6,87)  AAVER
          WRITE(6,69)   DAMEAN,DEQOM
          WRITE(6,90)  KDAY,NIGHT,VARDN
          WRITE (6,88)  LDN
          WRITE (6,89)  LNP
          WRITE (6,72)
          LD50 = JAL(2)
       87 FORMAT(3X,6HLEQ = ,F5.1)
       88 FORMAT(3X,6HLDN = ,F5.1,5X,
         174H  55 IS EPA IDENT.INTERFERENCE LEVEL.  75 IS EPA IDENT.HEARING
         2PROT. LEVEL)
       89 FORMAT(3X,6HLNP = ,F5.1,5X
         1,34H LNP=85 MAX FOR AIRCRAFT SUGGESTED)
       90 FORMAT(2X,13HLDN BASED ON ,I2,19H DAYTIME HOURS AND ,I2,16H NIGHTTIME HOUR
         1TME HOURS,10X,16HVARIANCE (LDN) =,F7.4)
          WRITE (6,50)
          AAL10(NDAY) = JAL(1)
          AAL50(NDAY) = JAL(2)
          AALEQ(NDAY) = AAVER
          DDEL(NDAY) = KSUM
C************** ********************************************************
          CALL CORREL4(NCASES,DEL,AL10,AL50,ALEQ,ALM)
```

```
C***********************************************************************
      STEP = 0.25
      NR = 1
C***********************************************************************
      CALL RAGEL4(NP,1,NFL,NP,X1,STEP,Y,1,1,NU2)
C***********************************************************************
      WRITE(6,990)
      WRITE(6,991)
  990 FORMAT(5X,*GRAPH 1 = L10,   GRAPH 2 = L50,   GRAPH 3 = LEQ STATISTICS
     1ICS*)
  991 FORMAT(5X,*GRAPH 4 = LMAX,   GRAPH 5 = L90,   GRAPH 6 = L1 STATIST
     1ICS*)
  996 NDAY=NDAY+1
      IF(NDAY.LE.NDAYS)  GO TO 2000
C***********************************************************************
      IF(ISKIP .EQ. 1)   GO TO 997
      PRINT 50
      IF(ICOR .EQ. 1)   GO TO 997
      PRINT 810
C***********************************************************************
      CALL CORREL4(NDAYS,UDEL,AAL10,AAL50,AALEQ,DAMEAN)
C***********************************************************************
  810 FORMAT(5X,*CORRELATIONS FOR THE WHOLE SET BASED ON NDAYS*)
      PRINT 50
      GO TO 997
C***********************************************************************
  999 CONTINUE
      PRINT 998
  998 FORMAT(1H ,*INPUT DATA ERROR*)
  997 CONTINUE
      END




      SUBROUTINE CUMUL(NDB,ISUM,DBP)
      DIMENSION NDB(76),DBP(76)
      COMMON /LEQ/KKK/FREQ/KBASE,FAC/LUMP/L1,L2
      INTEGER DBP
C    FIND TOTAL NUMBER OF SAMPLES FOR THE HOUR
      ISUM=0
      DO 101 N=L1,L2
      ISUM=ISUM+NDB(N)
  101 CONTINUE
      DBP(1) = 100.*FAC
      DUMMY = DBP(1)
      DO 111 IJ = 1,KKK
      DUMMY  =  DUMMY    -100.*FAC*NDB(IJ)/FLOAT(ISUM)
      DBP(IJ+1) = DUMMY
  111 CONTINUE
      RETURN
      END
      SUBROUTINE MODELS(NDB,MDB,DBP)
      DIMENSION   NDB(76),DBP(76)
      COMMON/LUMP/L1,L2 /MODEL/THRESK,SPREAD,RATIO,ISUM,MICTH
      INTEGER   THRESK,SPREAD,DBP,THRES1,THRES2
      IF(MICTH .EQ. 0)     GO TO 900
      IF(THRESK .GT.  L2)   GO TO 100
      THRES1 = THRESK-SPREAD
      THRES2 = THRESK+SPREAD
      IF(THRES2 .GT. L2)    THRES2 = L2
      DO 29 IJ = THRES2,L2
      NDB(IJ+1) = NDB(IJ+1)/RATIO
   29 CONTINUE
      IF (MICTH -2)  30,40,50
C      LINEAR MODEL
   30 DO 31 IJ = THRESK,THRES2
      NDB(IJ) = NDB(IJ)*(3.*(THRES2-IJ)/FLOAT(SPREAD)+1.)/RATIO
   31 CONTINUE
      GO TO 80
C      EXPONENTIAL MODEL
   40 DO 41 IJ = THRESK,THRES2
      NDB(IJ) = NDB(IJ)*(3.*EXP((THRESK-IJ)/FLOAT(SPREAD))+1.)/RATIO
   41 CONTINUE
      GO TO 80
C      PARABOLIC MODEL
   50 DO 51 IJ = THRESK,THRES2
      NDB(IJ) = NDB(IJ)*(3.*(1.-(IJ-THRESK)/FLOAT(SPREAD))**2+1.)/RATIO
   51 CONTINUE
      GO TO 80
  100 WRITE(6,101)
  101 FORMAT(5X,*BYPASSING MODELS BECAUSE THRESHOLD LEVEL TOO HIGH*)
      IF(MDB .NE. 1)      GO TO 110
   80 CONTINUE
      CALL CUMUL(NDB,ISUM,DBP)
  110 RETURN
  900 CONTINUE
      WRITE(6,99)
   99 FORMAT(5X,*CHECK YOUR MICTH INPUT , YOU SILLY - MODELS ERROR*)
      END
```

```
      SUBROUTINE LURN(DBP,JAL)
      DIMENSION   DBP(76),AAL(14),SPL(14),JAL(4)
      REAL   JAL
      INTEGER   DBP
      COMMON/LEQ/KKK/FREQ/KBASE,FAC
C      FIND L.1,L1,L10,L50,L90,L99
      AAL(1) = 0.001
      AAL(2) = 0.01
      AAL(3) = .05
      AAL(4) = .1
      AAL(5) = .2
      AAL(6) = .3
      AAL(7) = .4
      AAL(8) = .5
      AAL(9) = .6
      AAL(10)= .7
      AAL(11)= .8
      AAL(12)= .9
      AAL(13)= .95
      AAL(14)= .99
C   USE LAGRANGIAN INTERPOLATION
C   FNM1 = CDF(N-1),   FN = CDF(N),   FNP1 = CDF(N+1)
      MM = 1
      DO 707 NN =1,KKK
      KK=KKK-NN+1
  706 CONTINUE
      FN = DBP(KK)/(FAC*100.)
      DIF = FN-AAL(MM)
      IF (DIF)   707,709,708
  709 CONTINUE
      SPL(MM) = KK+KBASE-1.
      GO TO 710
  711 CONTINUE
      IF (BC .EQ. 0.)   GO TO 103
      SPL(MM) = -CC/BC
      GO TO 710
  712 CONTINUE
      SPL(MM) = SQRT(-CC/AC)
      GO TO 710
  708 CONTINUE
      FNP1 = DBP(KK+1)/(FAC*100.)
      IF (KK .GE. 70)   FNP1 = 0.
      FNM1 = FN
      IF(KK.GT.1)  FNM1 = DBP(KK-1)/(FAC*100.)
      AC = (FNP1+FNM1)/2.-FN
      B = (FNP1-FNM1)/2.
      IXN = KK+KBASE-1
      BC = B-2.*AC*IXN
      CC = AC*IXN*IXN-B*IXN+FN-AAL(MM)
      IF (AC .EQ. 0.)   GO TO 711
      IF (BC .EQ. 0.)   GO TO 712
      ARG = BC*BC-4.*AC*CC
      RAD = SQRT(ARG)
      SPL(MM) = -(BC+RAD)/(2.*AC)
  710 CONTINUE
      IF (MM .GT. 14)   GO TO 102
      MM = MM+1
      GO TO 706
  707 CONTINUE
  102 CONTINUE
      WRITE (6,77)  SPL(1),SPL(7),SPL(11)
      WRITE (6,78)  SPL(2),SPL(8),SPL(12)
      WRITE (6,79)  SPL(3)
      WRITE (6,80)  SPL(4)
      WRITE (6,81)  SPL(5),SPL(9),SPL(13)
      WRITE (6,82)  SPL(6),SPL(10),SPL(14)
   77 FORMAT (10X,7HL.1   = ,F6.2,10X,7HL40   = ,F6.2,10X,7HL80   = ,F6.2)
   78 FORMAT(10X,7HL1    = , F6.2,10X,7HL50   = ,F6.2,10X,7HL90   = ,F6.2)
   79 FORMAT(10X,7HL5    = , F6.2)
   80 FORMAT(10X,7HL10   = , F6.2,
      196H   FHWA DESIGN LEVELS  60(PARKS) 70(RES,SCH,CHC,HOSP,PUBLIC REC
     2 AREAS,LIB, SPT ARENAS,HOTELS,ETC)
   81 FORMAT(10X,7HL20  = ,F6.2,10X,7HL60  = ,F6.2,10X,7HL95  = ,F6.2)
   82 FORMAT (10X,7HL30  = ,F6.2,10X,7HL70  = ,F6.2,10X,7HL99  = ,F6.2)
      JAL(1) = SPL(4)
      JAL(2) = SPL(8)
      JAL(3) = SPL(12)
      JAL(4) = SPL(2)
      RETURN
  103 CONTINUE
      WRITE (6,91)
   91 FORMAT (5X,*ERROR IN LAGRANGIAN INTERPOLATION , BOTH A=0, B=0*)
      RETURN
      END



      SUBROUTINE FREQD(NDB,KUM,ISUM,LMIN,LMAX)
      DIMENSION   NDB(76),PPP(107),KUM(76)
C      PLOT FREQUENCY AND CUMULATIVE DISTRIBUTIONS
      COMMON/FREQ/KBASE,FAC
      DATA  STAR/1H*/, BLANK/1H /,SYM/1H1/
      MSTOR = 107
      ONESTAR = .003
      WRITE(6,55)
   55 FORMAT(1H0)
      L1 = LMIN-KBASE+1
      L2 = LMAX-KBASE+1
      DO 98 N = L1,L2
      NS = N+KBASE-1
      IF(NDB(N).LE.0)  NDB(N)=0
      DO 103 I = 1,MSTOR
      PPP(I) = BLANK
  103 CONTINUE
      PERCENT = NDB(N)/ FLOAT(ISUM)
      ICOUNT = PERCENT/ONESTAR+.5
      IF (ICOUNT.EQ.0)   GO TO 109
      DO 104 I = 1,ICOUNT
      IF (I .GT. MSTOR)   GO TO 109
      PPP(I) = STAR
  104 CONTINUE
  109 CONTINUE
      NCUM = KUM(N)/100.+.48
      PPP(NCUM) = SYM
      CUM = KUM(N)/FAC
      PRINT 71,     NS,   NDB(N), (PPP(I),I=1,MSTOR) ,CUM
   98 CONTINUE
   71 FORMAT( 5X,I3,2X,I6,3X,107A1,1X,F7.3)
      WRITE (6,75)  ISUM
   75 FORMAT(3X,26HTOTAL NUMBER OF SAMPLES = ,I7/)
      WRITE (6,56)
   56 FORMAT(1H8)
      RETURN
      END
      SUBROUTINE AVERAG(NDB,ISUM,LMAX,LMIN,VE,AV,AMEAN,VAR)
      DIMENSION   NDB(76)
C      COMPUTES FOLLOWING STATISTICS
C      VE = MEU L,    AV = LEQ
C      AMEAN = MEU P,     VAR = VARIANCE OF DECIBELS
      COMMON/FREQ/KBASE,FAC
      AVE = 0.
      UMEAN=0.
      UNN=0.
      VA2 = 0.
      L1 = LMIN-KBASE+1
      L2 = LMAX-KBASE+1
      DO 106 LL = L1,L2
      X = LL+KBASE-1
      PP = 0.1*X
      QQ=.5*PP
      XPO=FLOAT(NDB(LL))/FLOAT(ISUM)
      UN=XPO*10.**PP
      UMN=XPO*10.**QQ
      UNN=UN+UNN
      UMEAN=UMEAN+UMN
      VER = X*XPO
      AVE = AVE+VER
      VARI = X*VER
      VA2 = VA2+VARI
  106 CONTINUE
      VE = AVE
      AV=10.*ALOG10(UNN)
      AMEAN=20.*ALOG10(UMEAN)
      VAR = VA2-AVE*AVE
      RETURN
      END
```

```
      SUBROUTINE CORREL4(NCASES,DEL,AL10,AL50,ALEQ,ALM)
         DIMENSION DEL(24),AL10(24),AL50(24),ALEQ(24),ALM(24)
C*******************************************************************************
C
C          CALCULATIONS FOR CORRELATION COEFFICIENTS
C          IF CORRELATIONS ARE NOT REQUIRED , THEN REMOVE
C             1.   SECOND CONTINUATION CARD IN DIMENSION STATEMENT
C             2.   CARDS DEFINING  AL10,AL50,ALEQ,DEL
C
C          DEL = WEIGHTING TIME OVER THE PARTICULAR PERIOD - AN ARRAY
C          DDELT = TOTAL TIME FOR ALL CASES
C          A = CORRELATION BETWEEN L10 AND L AVERAGE
C          B = CORRELATION BETWEEN L50 AND L AVERAGE
C          C = CORRELATION BETWEEN L10 AND L50
C*****************************************(*************************************
      R1=R2=R3=R4=R5=R6=S10=S50=SEQ=SMN=0.
      SUM10=SUM50=SUMEQ=SUMN=DDELT=0.
      DO 117 I = 1,NCASES
      DDELT = DEL(I)+DDELT
```

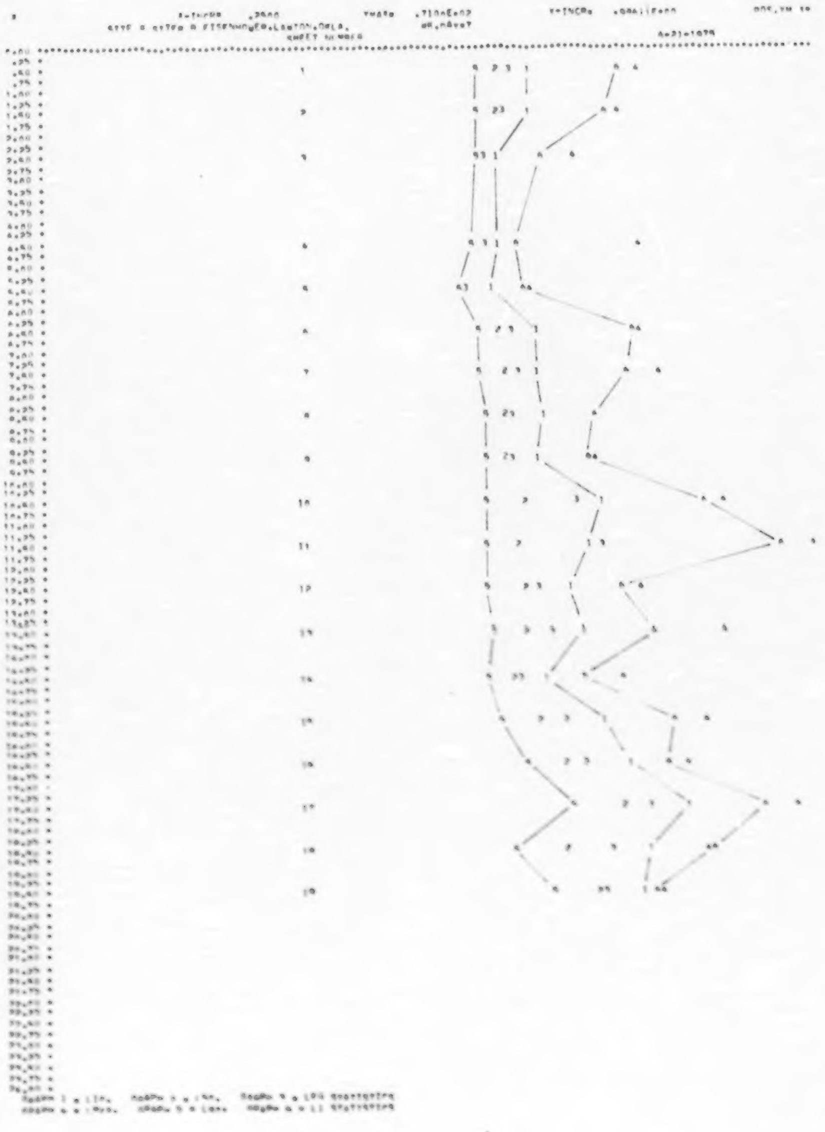
```
  117 CONTINUE
      DO 118 I=1,NCASES
      SUM10 = SUM10+(AL10(I)*DEL(I))/DDELT
      SUM50 = SUM50+(AL50(I)*DEL(I))/DDELT
      SUMEQ = SUMEQ+(ALEQ(I)*DEL(I))/DDELT
      SUMMN = SUMMN+(ALM(I)*DEL(I))/DDELT
  118 CONTINUE
      DO 811 I = 1,NCASES
      S10=S10+(AL10(I)-SUM10)**2*(DEL(I))
      S50=S50+(AL50(I)-SUM50)**2*(DEL(I))
      SEQ=SEQ+(ALEQ(I)-SUMEQ)**2*(DEL(I))
      SMN = SMN+(ALM(I)-SUMMN)**2*(DEL(I))
      R1=R1+(AL10(I)-SUM10)*(ALEQ(I)-SUMEQ) *DEL(I)
      R4=R4+(AL10(I)-SUM10)*(ALM(I)-SUMMN ) *DEL(I)
      R2=R2+(AL50(I)-SUM50)*(ALEQ(I)-SUMEQ) *DEL(I)
      R5=R5+(AL50(I)-SUM50)*( ALM(I)-SUMMN) *DEL(I)
      R3=R3+(AL50(I)-SUM50)*(AL10(I)-SUM10) *DEL(I)
      R6=R6+(ALEQ(I)-SUMEQ)*(ALM(I)-SUMMN)*DEL(I)
  811 CONTINUE
      SIG10=SQRT(S10)
      SIG50=SQRT(S50)
      SIGEQ=SQRT(SEQ)
      SIGMN = SQRT(SMN)
      A     =R1/(SIG10*SIGEQ)
      B     =R2/(SIG50*SIGEQ)
      C     =R3/(SIG10*SIG50)
      D = R4/(SIG10*SIGMN)
      E = R5/(SIG50*SIGMN)
      F = R6/(SIGEQ*SIGMN)
      WRITE(6,812)   A,D
      WRITE(6,813)    B,E
      WRITE(6,814)   C,F
  812 FORMAT(5X,7HREQ10 =,F6.3,5X,7HRMN10 =,F6.3)
  813 FORMAT(5X,7HREQ50 =,F6.3,5X,7HRMN50 =,F6.3)
  814 FORMAT(5X,7HR1050 =,F6.3,5X,7HRMNEQ =,F6.3)
C*************************************************************************
      RETURN
      END


      SUBROUTINE BAGEL4 (NR,NFF,NFL,NP,XI,STEP,Y,KSTEP,ND1,ND2)          NMOD0010
C                                                                        DECK  2
C     BAGEL PLOTS UP TO FOUR MULTIVALUED FUNCTIONS.  R.MACON  SM CTR  SMU
C
C     THIS IS A REVISED VERSION OF BAGEL.  REVISED 07/17/74 BY D A R NELSON JR.
C
C     NR      MAXIMUM NO. OF VALUES OF ANY Y(X) AT ANY PARTICULAR X.
C
C     NFF     NO. OF FIRST FUNCTION TO BE PLOTTED.
C
C     NFL     NO. OF LAST FUNCTION TO BE PLOTTED.  MAXIMUM IS NINE.
C
C     NP      NO. OF POINTS ON X AXIS FOR WHICH Y VALUES ARE TO BE PLOTTED.
```

```
      C
      C     XI      INITIAL VALUE OF X.
      C
      C     STEP    X-INCREMENT.
      C
      C     Y       ARRAY GIVING THE KTH VALUE OF THE ITH EQN, FOR X=XI+(J-1)STEP.
      C
      C     KSTEP   WHEN KSTEP=0, STEP IS USED AS Y-INCREMENT. WHEN KSTEP=1,
      C             Y-INCREMENT IS ADJUSTED SO THAT LARGEST POSITIVE VALUE OF Y IN
      C             Y(K,I,J) JUST FALLS ON GRAPH.
      C
      C     ND1     FIRST DIMENSION ON Y ARRAY IN CALLING PROGRAM.
      C
      C     ND2     SECOND DIMENSION ON Y ARRAY IN CALLING PROGRAM.
      C
      C     CAUTION**ON GRAPH, LINEAR DISTANCES BETWEEN +*S ARE NOT EQUAL IN X AND Y.
      C
            DIMENSION SYMBOL(10),SITE(10)
            DIMENSION PPP(121),Y(ND1,ND2,1)                                     NMOD0020
            COMMON/BAG/MON,DAY,YEAR,SITE
            DATA PLUS/1H+/,SYMBOL/1H0,1H1,1H2,1H3,1H4,1H5,1H6,1H7,1H8,1H9/,    NMOD0040
           1BLANK/1H /                                                          NMOD0041
            NCASE = 1
            STEPP=6. * STEP/ 10.                                                BAGL0050
            IF(KSTEP  .EQ.  0)GO TO 215                                         BAGL0070
      C
      C     FIND MAX. VALUE OF Y(K,I,J), ADJUST STEPP, IF KSTEP=1.....................
            BIG=0.0                                                             BAGL0080
            DO 210 J=1,NP                                                       BAGL0090
            DO 205 I=NFF,NFL                                                    NMOD0100
            DO 201 K=1,NR                                                       BAGL0110
            YMAG=Y(K,I,J)                                                       NMOD0120
            IF(BIG  .GE.  YMAG)GO TO 201                                        BAGL0130
            BIG=YMAG                                                            BAGL0140
        201 CONTINUE                                                            BAGL0150
        205 CONTINUE                                                            BAGL0160
        210 CONTINUE                                                            BAGL0170
            STEPP=BIG/120.                                                      JMOD0180
            RNCASE = 25./STEPP
            ICASE = RNCASE
      C
      C     PRINT HEADING...............................................................
        215 YMAX=ABS(120.* STEPP)                                               JMOD0190
            YSTEP= 10. * STEPP/ 6.                                              BAGL0200
            WRITE(6,2)STEP,YMAX,YSTEP                                           BAGL0210
          2 FORMAT (1H1/1H0/5X,1HX,       25X,7HX-INCR=,F9.4,13X,               NMOD0220
           15HYMAX=,E12.4,12X,7HY-INCR=,E13.5,10X,11H  POS.YMAX*)               NMOD0230
            WRITE(6,3)   SITE
          3 FORMAT (20X,7HSITE = ,10A5)
            WRITE(6,4)     MON,DAY,YEAR                                         BAGL0240
          4 FORMAT(48X,12HSHEET NUMBER,45X,3A4)
      C
            X=XI                                                                BAGL0260
            DO 700 JJ = 1,NP                                                    BAGL0270
            J = X/STEP +1.
      C
      C     FIND AND PRINT Y AXIS.........................................................
```

```
            RLAST=X-STEP                                                      RAGL0280
            RNEXT=X+STEP                                                      RAGL0290
            ALAST=ABS(RLAST)                                                  RAGL0300
            ANEXT=ABS(RNEXT)                                                  RAGL0310
            AX=ABS(X)                                                         RAGL0320
            IF(ALAST  .LT.  AX)GO TO 30                                       RAGL0330
            IF(ANEXT  .LT.  AX)GO TO 30                                       RAGL0340
            DO 296 N=1,121                                                    RAGL0350
            PPP(N)=PLUS                                                       RAGL0360
        296 CONTINUE                                                          RAGL0370
            GO TO 32                                                          RAGL0380
      C
      C     INITIALIZE PRINTOUT ARRAY.........................................................
         30 DO 500 N=1,121                                                    BAGL0390
            PPP(N)=BLANK                                                      RAGL0400
        500 CONTINUE                                                          RAGL0410
      C
      C     GENERATE PRINTOUT ARRAY...........................................................
         32 RPMAX = 0.
            DO 600 I=NFF,NFL                                                  NMOD0420
            DO 400 K=1,NR                                                     RAGL0430
            RP=ABS(Y(K,I,J))/STEPP                                            RAGL0440
            IF(RP  .LT.  .5)GO TO 560                                         RAGL0450
            IF (RPMAX .LT. RP)   RPMAX = RP
            IP = RP
            ERR = RP-IP
            IPP=IP                                                            RAGL0500
            IF(ERR  .GT.  .5)   IPP = IP+1
         70  IF(IPP  .GT. 120)GO TO 560                                       JMOD0520
            IF(Y(K,I,J)  .LT.  0.0)GO TO 560                                  NMOD0530
            PPP(IPP+ 1)=SYMBOL(I+1)                                           JMOD0540
        560 PPP(1) =PLUS                                                      JMOD0570
        400 CONTINUE                                                          RAGL0580
        600 CONTINUE                                                          RAGL0590
            IF(RPMAX .LT. RNCASE)   GO TO 800
            IF(NCASE .LT. 10)   PPP(ICASE) = SYMBOL(NCASE+1)
            IF(NCASE.GE.10.AND.NCASE.LT.20)    PPP(ICASE-1)=SYMBOL(2)
            IF(NCASE.GE.10.AND.NCASE.LT.20)    PPP(ICASE) = SYMBOL(NCASE-9)
            IF(NCASE .GE. 20)   PPP(ICASE-1) = SYMBOL(3)
            IF(NCASE .GE. 20)   PPP(ICASE) = SYMBOL(NCASE-19)
            NCASE = NCASE+1
        800 CONTINUE
      C
      C     PRINT PRINTOUT ARRAY..............................................................
            WRITE(6,1)X,PPP                                                   BAGL0600
          1 FORMAT(F8.2,1X,121A1)                                             RAGL0610
      C
            X=X+STEP                                                          RAGL0620
            IF(X .GT. 24.)    X = 0.
        700 CONTINUE                                                          RAGL0630
            WRITE(6,5)                                                        NMOD0631
          5 FORMAT(1HR)                                                       NMOD0632
            RETURN                                                            NMOD0633
            END                                                               RAGL0640
```

```
   2     HOURLY INFORMATION     SITE=3, WK.DAY=2,            *KAY COUNTY,PONCA,OKL,RATING-DES=0,EVL=2      6-16-1975

  HOUR =   12.00-13.00     SHEET NUMBER=302          NUMBER OF SAMPLES =     492
SOURCE COUNTS(TRANSPORTATION),FMVH= 1,SMPL= 0,JET= 0,COPT= 0,RAIL= 0,TRUCK= 0,AUTO= 2,BUS= 2,CYC= 1,RECVH= 0,WCRFT= 0
SOURCE COUNTS (EQUIP),CNSTR= 0,YARD= 0,FCTRY= 0,HOUSE= 1,    (MISC) DOGS= 0,LSPKR= 0
    DBA     NUMBER OF OCCURRENCES                              ATTENTION! THE FREQUENCY DISTRIBUTION IS NORMALISED        CUMUL DISTR
     46      11   *******                                                                                            1         100.000
     47      11   *******                                                                                          1            97.750
     48      42   *****************************                                                                  1              95.510
     49      42   *****************************                                                         1                       86.930
     50      44   ******************************                                               1                                78.360
     51      44   ******************************                                      1                                         69.380
     52      30   ********************                                       1                                                  60.400
     53      30   ********************                                 1                                                        54.280
     54      24   ****************                               1                                                              48.160
     55      24   ****************                          1                                                                   43.260
     56      17   ************                         1                                                                        38.360
     57      17   ************                     1                                                                            34.490
     58      14   **********                    1                                                                               31.420
     59      14   **********                  1                                                                                 28.570
     60      20   **************           1                                                                                    25.710
     61      20   **************       1                                                                                        21.630
     62       9   ******           1                                                                                            17.550
     63       9   ******         1                                                                                              15.710
     64      17   ************ 1                                                                                                13.870
     65      17   *********1**                                                                                                  10.400
     66       6   ****  1                                                                                                        6.930
     67       6   **** 1                                                                                                         5.710
     68       5   ***1                                                                                                           4.480
     69       5   **1                                                                                                            3.460
     70       4   *1*                                                                                                            2.440
     71       4   *1*                                                                                                            1.630
     72       1   1                                                                                                               .810
     73       1   1                                                                                                               .610
     74       1   *                                                                                                               .400
     75       1   *                                                                                                               .200
  TOTAL NUMBER OF SAMPLES =     490

         LMAX =  75
         L.1  =  75.50          L40  =  55.67          L80  =  49.81
         L1   =  71.77          L50  =  53.69          L90  =  48.72
         L5   =  67.58
         L10  =  64.75   FHWA DESIGN LEVELS  60(PARKS)  70(RES,SCH,CHC,HOSP,PUBLIC REC AREAS,LIB, SPT ARENAS,HOTELS,ETC
         L20  =  61.40          L60  =  52.05          L95  =  48.09
         L30  =  58.47          L70  =  50.93          L99  =  46.57
         LMIN =  46

  TNI =  82.8                    VARIANCE (L) =40.4999          MEAN (L) =54.9998
  LNP (GAUSSIAN) =  74.0     LNP=85 MAX FOR AIRCRAFT SUGGESTED
  LEQ =  60.6
  LMEAN= 57.7     LEQ/LMEAN= 1.050
  LNP =  76.9      LNP=85 MAX FOR AIRCRAFT SUGGESTED

************************************************************************************************************************
```

```
1         DAILY INFORMATION     SITE=3, WK.DAY=2,            *KAY COUNTY,PONCA,OKL 6-16-1975
  DBA    NUMBER OF OCCURRENCES                                       ATTENTION! THE FREQUENCY DISTRIBUTION IS NORMALISED      CUMUL DISTR
  46     22   *****                                                                                                      1          100.000
  47     22   *****                                                                                                   1              98.470
  48    145   *************************************                                                                  1               96.940
  49    145   *************************************                                                        1                         86.890
  50    131   *********************************                                                 1                                    75.830
  51    131   *********************************                                       1                                              67.750
  52     91   ***********************                                        1                                                       58.660
  53     91   ***********************                                1                                                               52.350
  54     80   ********************                             1                                                                     46.040
  55     80   ********************                      1                                                                            40.490
  56     41   **********                           1                                                                                 34.950
  57     41   **********                        1                                                                                    32.100
  58     35   *********                      1                                                                                       29.260
  59     35   *********                   1                                                                                          26.830
  60     43   ***********              1                                                                                             24.410
  61     43   ***********           1                                                                                                21.420
  62     37   **********         1                                                                                                   18.440
  63     37   **********       1                                                                                                     15.880
  64     48   ************  1                                                                                                        13.310
  65     48   **********1*                                                                                                            9.980
  66     20   ***** 1                                                                                                                 6.650
  67     20   ****1                                                                                                                   5.270
  68      9   ** 1                                                                                                                    3.880
  69      9   **1                                                                                                                     3.250
  70     11   **1                                                                                                                     2.630
  71     11   *1*                                                                                                                     1.870
  72      3   1                                                                                                                       1.100
  73      3   1                                                                                                                        .900
  74      4   1                                                                                                                        .690
  75      4   *                                                                                                                        .410
  76      0                                                                                                                            .130
  77      0                                                                                                                            .130
  78      0                                                                                                                            .130
  79      0                                                                                                                            .130
  80      0                                                                                                                            .130
  81      0                                                                                                                            .130
  82      1                                                                                                                            .130
  83      1                                                                                                                            .060
TOTAL NUMBER OF SAMPLES =     1442

          LMAX =  83
          L.1  =  82.55          L40  =  55.09          L80  =  49.68
          L1   =  72.24          L50  =  53.37          L90  =  48.77
          L5   =  67.19
          L10  =  64.99     FHWA DESIGN LEVELS  60(PARKS)  70(RES,SCH,CHC,HOSP,PUBLIC REC AREAS,LIB, SPT ARENAS,MOTELS,ETC
          L20  =  61.48          L60  =  51.85          L95  =  48.28
          L30  =  57.74          L70  =  50.74          L99  =  46.75
          LMIN =  46
 TNI =  83.7                         VARIANCE (L) =40.8658          MEAN (L) =54.7845
 LEQ =  61.4
 LMEAN= 57.7       LEQ/LMEAN= 1.064
LDN BASED ON   3 DAYTIME HOURS AND  0 NIGHTTIME HOURS          VARIANCE (LDN) =40.8658
 LDN =  61.4         55 IS EPA IDENT.INTERFERENCE LEVEL.  75 IS EPA IDENT.HEARING PROT. LEVEL
 LNP =  77.7        LNP=85 MAX FOR AIRCRAFT SUGGESTED
```

 X-INCR= .2500
YMAX= .7100E+02
Y-INCR= [illegible]
SITE = SITE9 = EISENHOWER,LAWTON,OKLA.
SHEET NUMBER
6-21-1978
1
2
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GRAPH 1 = [illegible] GRAPH 2 = [illegible] GRAPH 3 = LOG STATISTICS
GRAPH 4 = [illegible] GRAPH 5 = [illegible] GRAPH 6 = [illegible] STATISTICS

APPENDIX E

This appendix contains a summary of the weather statistics observed and the artillery activity at Fort Sill during the assessment.

APPENDIX E-I

TIME - (HRS)	TEMP (F)	RELATIVE HUMIDITY (%)	WIND SPEED (KNOTS)	WIND DIRECTION (DEGREES FROM NORTH)	BAROMETRIC PRESSURE
1:00	77	73	10	160	28.610
2:00	78	79	12	160	28.425
3:00	77	81	11	170	28.435
4:00	77	76	14	160	28.445
5:00	77	76	11	150	28.450
6:00	76	79	12	150	28.460
7:00	75	82	12	150	28.495
8:00	76	79	14	170	28.515
9:00	77	76	15	150	28.535
10:00	79	71	18 G 23	160	28.555
11:00	83	62	23 G 28	170	28.550
12:00	85	57	20 G 26	170	28.540
13:00	86	57	18 G 28	170	28.525
14:00	88	52	20 G 29	160	28.515
15:00	90	50	20 G 26	170	28.510
16:00	90	48	20 G 26	160	28.510
17:00	91	45	24 G 30	160	28.495
18:00	89	48	18 G 25	160	28.495
19:00	87	53	22 G 29	150	28.485
20:00	85	56	24 G 30	160	28.495
21:00	84	56	14 G 21	160	28.510
22:00	82	58	12 G 19	160	28.555
23:00	80	64	10	160	28.590
24:00	78	71	8	160	28.595

June 18, 1975

TIME - (HRS)	TEMP (F)	RELATIVE HUMIDITY (%)	WIND SPEED (KNOTS)	WIND DIRECTION (DEGREES FROM NORTH)	BAROMETRIC PRESSURE
1:00	77	76	8	150	28.755
2:00	77	73	12	150	28.615
3:00	77	76	12	160	28.630
4:00	77	79	12	160	28.640
5:00	76	81	12	160	28.640
6:00	75	84	13	160	28.650
7:00	75	84	12	160	28.650
8:00	76	81	14	160	28.685
9:00	78	79	14 G 20	170	28.710
10:00	81	69	15 G 27	170	28.710
11:00	83	65	16 G 20	180	28.720
12:00	84	63	14 G 20	180	28.725
13:00	85	59	18	170	28.725
14:00	87	55	16 G 22	160	28.725
15:00	88	53	16	160	28.690
16:00	90	50	15	140	28.685
17:00	88	53	15	140	28.685
18:00	88	51	19 G 24	140	28.685
19:00	87	51	16 G 23	150	28.660
20:00	85	53	16	140	28.660
21:00	83	58	12	140	28.670
22:00	81	60	9	140	28.690
23:00	79	64	8	130	28.720
24:00	78	68	7	130	28.745

June 19, 1975

TIME - (HRS)	TEMP (F)	RELATIVE HUMIDITY (%)	WIND SPEED (KNOTS)	WIND DIRECTION (DEGREES FROM NORTH)	BAROMETRIC PRESSURE
1:00	77	76	10	140	28.720
2:00	76	73	8	140	28.745
3:00	76	76	7	150	28.750
4:00	74	81	7	150	28.745
5:00	73	84	8	140	28.750
6:00	73	87	7	150	28.750
7:00	73	90	5	150	28.765
8:00	74	87	7	140	28.785
9:00	76	84	12	140	28.795
10:00	79	74	14	150	28.795
11:00	80	68	14	170	28.795
12:00	82	65	10	180	28.795
13:00	87	55	15 G 20	180	28.775
14:00	86	57	11	170	28.750
15:00	89	52	10	190	28.735
16:00	88	53	13	140	28.720
17:00	87	55	12	150	28.710
18:00	87	55	12	160	28.690
19:00	87	55	14	160	28.685
20:00	85	58	14	140	28.675
21:00	83	60	12	140	28.660
22:00	81	64	9	150	28.670
23:00	80	67	10	150	28.710
24:00	79	71	8	140	28.720

June 20, 1975

			WIND		
TIME - (HRS)	TEMP (F)	RELATIVE HUMIDITY (%)	SPEED (KNOTS)	DIRECTION (DEGREES FROM NORTH)	BAROMETRIC PRESSURE
1:00	73	76	10	110	29.685
2:00					
3:00					
4:00					
5:00					
6:00					
7:00	72	87	04	130	28.725
8:00	74	84	10	150	28.735
9:00	77	79	08	160	28.735
10:00	81	67	07	170	28.745
11:00	83	63	10	160	28.720
12:00	82	64	14	170	28.715
13:00	84	61	09	170	28.690
14:00	85	59	08 G 18	170	28.680
15:00	86	55	12 G 18	160	28.645
16:00	87	53	12 G 19	160	28.650
17:00	86	55	14	150	28.630
18:00	82	51	15	130	28.630
19:00	82	60	13	140	28.610
20:00	70	84	02	340	28.670
21:00	72	91	00	000	28.655
22:00	72	71	06	070	28.690
23:00	70	82	09	190	28.745
24:00	71	87	16	140	29.680

June 21, 1975

			WIND		
TIME - (HRS)	TEMP (F)	RELATIVE HUMIDITY (%)	SPEED (KNOTS)	DIRECTION (DEGREES FROM NORTH)	BAROMETRIC PRESSURE
1:00	76		07	130	28.700
2:00	73	84	02	090	28.675
3:00	64	87	04	360	29.755
4:00	65	84	12	360	29.735
5:00	66	78	22 G 28	040	29.640
6:00	66	81	08	080	28.675
7:00	66	78	04	120	28.675
8:00	66	84	05	210	28.715
9:00	67	84	05	170	28.745
10:00	68	81	04	120	28.775
11:00	70	78	04	140	28.775
12:00	75	73	10	140	28.760
13:00	78	68	09	150	28.760
14:00	80	68	07	180	28.740
15:00	83	72	10	150	28.735
16:00	84	73	10	170	28.720
17:00	85	61	09	170	28.715
18:00	85	63	08	180	28.695
19:00	85	61	10	170	28.695
20:00	83	65	06	160	28.705
21:00	81	69	04	150	28.725
22:00	79	76	04	150	28.750
23:00	78		02	120	
24:00	78		06	140	

June 22, 1975

TIME - (HRS)	TEMP (F)	RELATIVE HUMIDITY (%)	WIND SPEED (KNOTS)	WIND DIRECTION (DEGREES FROM NORTH)	BAROMETRIC PRESSURE
1:00	69	90	04	060	28.895
2:00	76	82	08	150	
3:00	76	79	10	160	
4:00	75	81	07	190	28.740
5:00	74	84	05	150	
6:00	73	87	02	130	
7:00	73	87	03	170	
8:00	75	85	07	150	28.820
9:00	78	79	06	160	28.860
10:00	81	72	06	180	28.860
11:00	83	69	06	180	28.865
12:00	83	69	07	200	28.865
13:00	84	67	08	220	28.860
14:00	76	79	14 G 23	040	28.855
15:00	71	87	16 G 24	080	28.855
16:00	69	90	12 G 16	070	28.875
17:00	70	89	10	120	28.875
18:00	71	87	05	080	28.850
19:00	72	87	02	060	28.830
20:00	73	85	01	100	28.825
21:00	72	88	CALM	CALM	28.825
22:00	72	84	07	140	28.840
23:00	72	84	04	150	28.870
24:00	70	87	CALM	CALM	28.885

June 23, 1975

			WIND		
TIME - (HRS)	TEMP (F)	RELATIVE HUMIDITY (%)	SPEED (KNOTS)	DIRECTION (DEGREES FROM NORTH)	BAROMETRIC PRESSURE
1:00	75	81	05	150	28.840
2:00	68	93	01	006	28.900
3:00	68	93	01	034	28.885
4:00	68	90	03	002	28.870
5:00	69	90	04	028	28.900
6:00	70	90	04	011	28.905
7:00	70	90	05	012	28.895
8:00	72	90	08	013	28.885
9:00	74	87	10	014	28.900
10:00	77	81	12	015	28.905
11:00	80	76	11	016	28.905
12:00	81	74	11	016	28.915
13:00	84	67	10	016	28.915
14:00	84	67	10	017	28.900
15:00	80	76	03	010	28.860
16:00	82	69	07	018	28.845
17:00	77	84	06	010	28.850
18:00	77	84	02	010	28.855
19:00	76	87	03	020	28.840
20:00	78	82	02	040	28.840
21:00	77	84	CALM	CALM	28.840
22:00	76	88	04	130	28.820
23:00	76	84	04	120	28.840
24:00	75	84	04	140	28.855

June 24, 1975

TIME - (HRS)	TEMP (F)	RELATIVE HUMIDITY (%)	WIND SPEED (KNOTS)	WIND DIRECTION (DEGREES FROM NORTH)	BAROMETRIC PRESSURE
1:00	74	84	05	140	28.825
2:00	72	87	03	140	28.820
3:00	71	90	00	000	28.810
4:00	70	90	02	120	28.800
5:00	69	93	03	120	28.810
6:00	70	90	05	120	28.820
7:00	71	90	08	130	28.835
8:00	73	87	09	013	28.840
9:00	76	81	07	015	28.840
10:00	77	81	06	015	28.825
11:00					
12:00					
13:00					
14:00					
15:00					
16:00					
17:00					
18:00					
19:00					
20:00					
21:00					
22:00					
23:00					
24:00					

June 25, 1975

APPENDIX E 2

Summary of Firing Activity at Fort Sill during the assessment

FIRING ORDER NR. 294
For Saturday 21 Jun 75, WEST RANGE 11 Jun 75

SMALL ARMS FIRING

Range	Unit	Period	Weapon and Ammunition
MB 1 Rifle & Pistol	4/31	1200-1800	7.62mm & 45 P
Falcon Rg	AF	0800-1700	20mm & Inert Bombs

ARTILLERY FIRING

Problem	Time	Firing Pts.	OPs	Weapon and Ammunition	GP Area
			1/158		
Spc	0730-2000	159, 173N 176, 179 183, 196W	Kerr Hill	8"H	WMHA MHA
			1/160		
Spc	0900-2400	604, 604W, 624S	Kerr Hill Daly Hill	105H VT	BBA
			45th FA GP		
Spc	0700-2400	278, 289 280, 293, 283 535, 415	Andrews Hill Indian Hill	8"H VT HES	AGA

FIRING ORDER NR. 295
For Sunday 22 Jun 75, WEST RANGE 11 Jun 75

ARTILLERY FIRING

Problem	Time	Firing Pts.	OPs	Weapon and Ammunition	GP Area
		1/158			
Spc	0700-1400	159, 173N, 176, 179, 183, 196W	Kerr Hill	8"H	WMHA MHA
		1/160			
Spc	0001-1400	604, 604N, 624S	Kerr Hill Daly Hill	105H VT	BBA
		45th FA GP			
Spc	0001-1400	278, 289, 280, 298, 283, 535, 415	Andrews Hill Indian Hill	8"H VT HES	AGA

FIRING ORDER NR. 296
For Monday 23 Jun 75, WEST RANGE 18 Jun 75

SMALL ARMS FIRING

Range	Unit	Period	Weapon and Ammunition
Rappelling	PC & W	1300-1600	NA

ARTILLERY FIRING

Problem	Time	Firing Pts.	OPs	Weapon and Ammunition	GP Area
			Gunnery		
G002SA	1220-1640	1OW	68E, 68W, 69E, 69	105H Inc ICM	MHA
			FAS BDE		
Spc	0830-1630	628		14.5MMG	SMA
			1/30		
Spc	0800-	284	Indian Hill Apache Ridge	8"H VT	AGA
			Arty Bd		
Spc	0730-1800	173, 82	Daly Hill	105H	WMHA
		82	McKenzie Hill	155H	JRA
		706		8"H	ARA
					CCA
			III CA		
Spc	1800-2400	32334 35814* 32729 36427 32881 36929	170N, 171, 175, 177	8"HVT HES *ICM	QCA

NONFIRING ACTIVITIES

TAD (AS32NG)	1240-1640	Sta 30 & 33: Mission Hill & FP 177E
" (ANXXAB)	1240-2330	Land Navigation, Ketch Lake to South
FAS BDE	0800-1200	Grid 513 380 FTX
	0800-1600	Grid 52 34
	1100-1630	Grid 499 407 FTX
III CA	1200-2400	Bateman Woods, Grid 515 395, Peachtree Crossing
T/CAD (TR02FZ)	0700-2400	Grid 402 388
8/175 Gun Btry	0800-2400	FP 714, 720, 722, 806
Arty Bd	0-01-2400	_rid 512 330

FIRING ORDER NR. 297
For Monday 23 Jun 75, EAST RANGE 18 Jun 75

SMALL ARMS FIRING

Range	Unit	Period	Weapon and Ammunition
TF Complex I	100th S & S	0730-1630	M16

ARTILLERY FIRING

Problem	Time	Firing Pts.	OPs	Weapon and Ammunition	GP Area
			Gunnery		
G031SJ	1220-1640	510	Arbuckle Hill	105H VT HC WP	SAA
GDO2TA	1220-1640	313E	408E, 408, 408W	155H VT HC WP	SAA
			TAD		
AT07DP/ AT23OP	0730-1640	497E, 408S	408	155H	NAA SAA
		58786 34642		TNT	NAA SAA
		59470 34533			
		59895 33403			
		60259 33192			
		59407 33573			
		59196 33855			
		60964 33282			
		61537 33277			
		61933 33918			
		62144 33576			
		62626 33504			
		62976 33577			
		63712 33199			
		64206 33238			
		64438 33552			
		61760 46455			
		61500 45900			
		62945 45875			
		63260 46075			
			1/30		
Spc	0800-2400	347	407	8"H VT	BCA

FIRING ORDER NR. 298
For Tuesday 24 Jun 75, WEST RANGE 18 Jun 75

SMALL ARMS FIRING

Range	Unit	Period	Weapon and Ammunition
MB 1 Rifle & Pistol	4/31	1200-1800	7.62mm & 45 P
MB 2 Pistol	USMCR	0730-1630	45 P
Jones Ridge RR	USMCR	0730-1630	M14, M16
Falcon Range	AF	0800-1700	Inert Bombs

ARTILLERY FIRING

Problem	Time	Firing Pts.	OPs	Weapon and Ammunition	GP Area
			Gunnery		
G002TC	0710-1130	116N	122S, 17	155H VT HC WP	ARA
			T/CAD		
TR02FZ	0730- 2400	901*, 909, 914+, 919, 920*, 922, 923*, 930, 650S, FEB10- (3783 3388)	411395 437344 4334 to 4335	155H VT HC WP *ILLUM +Direct Fire	BBA WMHA CCA
		153E, FEB 32- (3731 4046)		105H VT HC WP	
		4149 3564		TNT	SMA
			III CA		
Spc	1800- 2400	36285 33826 35809 35729 35780 34871	170N, 171, 175, 177	8"H VT HES	CCA
Spc	0001- 2400	32334 35814* 32729 36427 32881 36929	170N, 171 175, 177	8"H VT HES *ICM	QCA
			FAS Bde		
Spc	0730- 1630	228E 116N	126	105H 155H & 8"H	AGA ARA

ARTILLERY FIRING

Problem	Time	Firing Pts.	OPs	Weapon and Ammunition	GP Area
			8/175		
Spc	0001-2400	712W 808, 810	Kerr Hill Daly Hill	175G	QCA
			1/30		
Spc	0001-2400	284, 288	Indian Hill Apache R	8"H VT	AGA
			Arty Bd		
Spc	0730-1800	664, 604	126	105H	WMHA
		701		155H M109a1	BBA
		803		175G	CCA
		706, 643		8"H	RCA
			2/37th		
Spc	0600-1800	289	Indian Hill Apache Ridge	155H	AGA

AIRLIFT INTO FP 228E

NONFIRING ACTIVITIES

T/CAD (TRO2FZ)	1430 0001-2400	FP 922, 920 402 388
TAD (AS32EF)	0730-1640	Sta 28, 29, 30 & 89; JRA 3; Mission Ridge; & Barbwire Hill
" (AS32DB)	0730-1640	Sta Flagg, 37, 30; Grids 591512, 591404, 584415, 520408, 525395, 507395, 483415, 480410, 443413, 414409, Zoom Pratt Hill
" (AN60AB)	1420-2330	Land Navigation, Ketch Lake to South Boundary
FAS BDE	0800-1630	FP 261, 265, 262, Grid 520340
"	1900-2400	FP 215, 249 FTX
Arty Bd	0001-2400	Grid 512330

FIRING ORDER NR. 299
For Tuesday 24 Jun 75, EAST RANGE

18 Jun 75

SMALL ARMS FIRING

Range	Unit	Period	Weapon and Ammunition
TF Complex I	3/9	0630-1700	M16

ARTILLERY FIRING

Problem	Time	Firing Pts.	OPs	Weapon and Ammunition	GP Area
			Gunnery		
G031SJ	0710-1130	510	Arbuckle Hill	105H VT HC WP	SAA
			WD		
WC02UP	0730-1640	362	402	8"H VT	BCA
			1/30		
Spc	0001-2400	347	407	8"H VT	BCA
			III CA		
Spc	1800-2400	58538 34033 58320 35156 57992 35716	400E 407E BRC Potato Hill	8"H VT HES	SAA

GLOSSARY

'A' Weighting: An electronic filtering network employed in sound level meters to reduce the effect of very low and very high frequency sound on the meter so that its indication is more closely correlated with human response to sound.

Composite Noise Rating (CNR): An estimate of community response to noise in a specified area based upon estimates of corresponding sound source intensities, incidence rates, and appropriate adjustments for time of day, season of year, and expected community sensitivity to noise.

Day Night Average Sound Level (L_{dn}): The energy equivalent average sound level for a 24 hour period calculated after compensating for the increased human sensitivity to environmental noise during the nighttime by adding 10 decibels to measured nighttime (2200 - 0700 hours) sound levels.

Decibel (dB): In acoustics, the unit for describing the intensity of a sound. It is one tenth of a Bel, the unit corresponding to the logarithm (base ten) of a sound's intensity relative to that of the minimum audible sound.

Energy Equivalent Average Sound Level (L_{eq}): The sound level corresponding to the average sound energy during a specified period of time. Its calculation involves the conversion of decibels (a logarithmic quantity) to corresponding intensities (a linear quantity), performing the averaging, and finally changing the average back to decibels.

Noise: An undesirable sound, either unwanted or detrimental to human hearing or activity.

Percentile Sound Level (L_{10}, L_{50}, etc.): The sound level exceeded a specified percentage of the time during a measurement period.

Sound: In air, any pattern of air particle oscillation which propagates through the atmosphere.

Sound Level (dBA, etc.): A measurement of sound amplitude, expressed in decibels, obtained with a standard sound level meter employing 'A', 'B', or 'C' frequency weighting (ANSI S1.4 - 1971) for attenuating part of the sound spectrum. If the frequency weighting employed is not indicated, 'A' weighting is implied.